ILLUSTRATED
ELECTRICAL REVIEW
A Journal of Scientific and Electrical Progress.

VOL. 30. No. 20. WEEKLY. | NEW YORK, WEDNESDAY, MAY 19, 1897. | $3 PER ANNUM. Single Copies, 10 Cents.

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VIEWS, NEWS AND INTERVIEWS.

During the last 25 years the United States Patent Office has granted 711 patents to Thomas A. Edison.

It is told of General Grant that when he arrived in San Francisco from his famous trip around the world, during the period in which the telephone was perfected and brought into use, he blushed like a schoolboy and looked foolish when a mutual friend arranged a conversation by wire between the great warrior and his wife; Mrs. Grant being at the residence of the friend, while the General was at his place of business, many blocks from the house. General Grant looked as though he believed he was being tricked, and that his wife must be near by hiding, when he distinctly heard her voice from the other end of the telephone wire.

The Humphrey street-car bills were defeated in the Illinois Legislature, at Springfield, on May 12. These are the bills for which Mr. Yerkes, the Chicago street-car magnate, has been lobbying. The enacting clause, extending franchises of Chicago street railways 50 years when they expired in 1903, was stricken out by a vote of 123 yeas to 29 nays.

What at first promised to be an unsolvable suicide mystery was untangled in New York city last week, by means of a fragment torn from a Postal Telegraph message blank found on the corpse. One morning recently a watchman discovered the body of a woman floating in the Central Park reservoir. She had evidently committed suicide, as every mark by which she might be identified had been removed from her clothing. In her pockets were several notes, all signed with the same fictitious name, "Titania". The clew which ultimately led to her positive identity was a scrap torn from a telegraph blank in which was carefully wrapped a single violet. The only marks upon the paper were the number "59" and the check letters of the sending and receiving operators. When Superintendent Bradley, of the Postal Telegraph Company, received the paper from the Coroner, he immediately set seven men at work to trace the telegram. They began their task first upon the check marks. These were much faded by the action of the water, but that of the receiving operator was made out, with the aid of a magnifying glass, to be "Tb". This is an uncommon signature, and there is an operator in the main office who uses it. The check of the receiving operator was illegible, because part of it had been torn off, but the writing that remained was found to be the first part of the letter "F". After nearly 24 hours' work, and the examination of hundreds of telegrams numbered 59, one was found sent by Tb to Fu, a receiving operator in Brooklyn. This was addressed to a name which proved to be that of the suicide.

The late Mr. J. J. Storrow, counsel for the American Bell Telephone Company, is said to have received a salary of $50,000 a year.

An unusual accident is reported from Richmond, Va. One day recently Jesse W. Clark was standing on Mayo's Bridge watching some persons fishing. A trolley car came along. The wind blew the rope attached to the trolley. It swung out, encircled Clark's neck and jerked him 10 feet. His throat was badly lacerated.

It is expected that the West End Street Railway Company's cars will use the Boston subway by June 17, and possibly before. Five sections are practically completed and ready for iron. The rails are laid and wires strung through Section 1.

According to a daily paper, a Portland night watchman who "couldn't see any sense in traipsing around the big empty mill every hour to touch the electric buttons", fixed up an automatic arrangement on several of them so that they would repeat every hour. The firm did not take kindly to this invention and gave the man a pedometer to carry on his rounds. All went well for two nights, but on the morning following the third, the old man was found asleep in the engine room, with the pedometer so attached to the piston rod that with every stroke it registered a step. It had been traveling all night, and when taken off it registered 209 miles. There is a new watchman on duty now.

The King of Siam has just granted a franchise for an electric lighting plant in Bangkok to an American firm.

Machinery Building, Where a Part of the Electrical Exhibit is Displayed at the Tennessee Centennial Exposition.

The Tennessee Centennial Exposition.

To the Editor of Electrical Review:

The Tennessee Centennial Exposition opened promptly on May 1, with the grounds, buildings and exhibits in better condition than is usually seen on "opening" days, and the hearts of the managers must have felt glad when the count of the turnstiles was made known.

The total attendance for the first day was given as 50,000, and the general expression of the visitors was one of satisfaction and praise. Those of the visitors who attended the Atlanta Exposition last year pronounce this in every way superior, especially as to the class of the buildings and the beauty of the grounds.

Unfortunately, the managers of the Tennessee Centennial did not, for some reason—best known to themselves—consider it essential to the success of the enterprise to devote a building exclusively to electricity and electrical displays, as was done in Atlanta, but assigned exhibitors of electrical apparatus and devices to spaces in the Commerce Building and Machinery Hall. In the former building, the American Electric Telephone Company, of Chicago, with its usual vigor, and to further emphasize its claim to the place in the front rank of the procession of leading independent telephone apparatus manufacturers of this country, has a very elaborate and interesting exhibit of the latest devices in switchboards and long-distance telephones, in charge of competent attendants; while in the latter building the General Electric Company has probably the most interesting exhibit.

It is a remarkable fact that every inch of space in the various buildings has been allotted and numerous applications for space have been refused, although a very large annex to the Commerce Building has been added, the capacity of which has been completely taken up with foreign exhibits, which were too late for space in the main building. The general impression among the exhibitors is one of confidence in the successful outcome of the exposition, notwithstanding the fact that it will have to endure the hot months. We look for the electrical people later in the season.

M. O'Reanon.

Nashville, May 7.

TUBING FOR INTERIOR ELECTRIC LIGHTING WIRES.

BY CHARLES HENRY DAVIS, C. E., AND HOWARD C. FORBES, S. B.

The recent discussion of the members of the Underwriters' National Electrical Association on the subject of "lined" vs. "unlined" interior iron or steel conduits for electric light wires, and the fact that this subject has been much thought of and studied by those interested in the electrical business, has been instrumental in suggesting to the writers the following, as giving some light on this important subject.

There are two standpoints from which we can approach the subject, (a) the commercial, (b) the engineering.

I. FROM THE COMMERCIAL STANDPOINT.

Lined tubing is more costly than unlined; this difference in cost is not likely to have an appreciable effect in the use of one or the other so far as owners (and therefore the contractors) are concerned, for the aggregate difference on installations of average size is of small moment compared to the total cost; the difference being small, the owner, helped by the engineer, who, usually leans towards the most durable and substantial, will purchase that which appears to him to be best, whether lined or unlined; the fire underwriters and local fire department will require that which insures the greatest immunity from fire risk, irrespective of cost, except as they may be influenced, by pressure brought to bear on them, by those interested in the manufacture of one or the other type. That the difference in cost will have little effect is shown by the fact that in many cases, as shown by actual bids received, the use of iron-armored conduit is as cheap as running heavy wires on insulators; while the conduit costs more than the insulators and their supports, the saving in labor counterbalances the extra cost of conduits. This, however, is not true in all cases; therefore, if there is greater ease in drawing wires in and smaller tubes can be used with "lined" tubes, the saving in size and labor will offset the extra cost of lining. The manufacturer of "lined" conduit will naturally oppose authorization of the use of plain iron or steel tubing, not only because of his investment in plant, but because it will be hard for him to believe that contractors will see the full force of the argument, that first cost will be substantially the same, and therefore buy the lined tubing rather than the unlined. Some general contractors installing isolated electric lighting plants fear, if unlined pipes are allowed, that gas or steam fitters will take this part of the business away from them. Local labor conditions would have an influence on this, but it is unlikely that these general contractors would lose their hold on this part of the business, because of the intimate connection the proper running of these conduits has to the balance of the system, in fact they are and always will be inseparable. From the business and fire risk standpoint the lining of the conduit is undoubtedly an additional safe-guard, but it may be that it is an unnecessary one, although not one that materially adds to the expense.

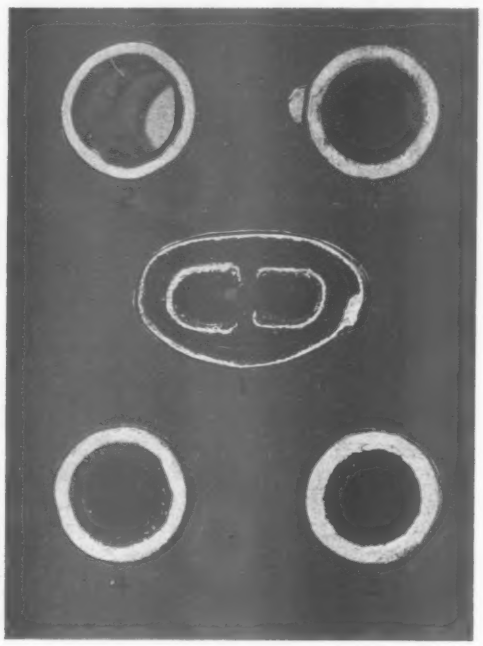


PLATE A.

II. FROM THE ENGINEERING STANDPOINT.

The subject of running electric wires in tubes for interior construction resolves itself, from an engineering point of view, into three factors; namely, the conductor, the insulating material and the raceway or tube.

We have to consider, as the conductor and its insulation, the standard rubber-covered wires that are now on the market, although the future may see other classes of insulation authorized by our local authorities. The insulation of rubber covered wires is as good for this purpose as for other classes of wiring, providing the wire can be put in place without injury, and, when in place, held so as to prevent any actual contact with an electrical conductor, such as the iron pipe. The principle of installing wires without injuring the insulation and preventing contact with conducting materials is universal for all other methods of wiring, such as cleat work, mouldings, etc. (lead-covered cables excepted), and hence, it would seem, should be applied here, unless some good means are adopted to avoid the difficulties arising from a violation of these principles.

For the raceway it is evident that for mechanical strength the ordinary steam or gas pipe of iron is the best tube that can be used; mechanically, thinner forms of steel tubes, or sheet-iron or brass-covered tubes become inferior in proportion to their thinness; just where the line should be drawn, in reducing the thickness of the metal of the tube, is a point not yet well settled. Iron tubes put into a building for electric wires are subject to the same treatment as gas piping. Both receive mechanical abuse. They are trodden on for months during the construction of the building; they are run over by loaded wheelbarrows; heavy cases are dropped on them; in putting down floors a nail is likely to be driven directly against them, or through them if not strong enough to resist. Joints in the electric tubing should be watertight, which requires nearly as good work as to make a gastight joint and, therefore, there seems to be no more reason for using the thinner tubing for electric wires than for gas piping. The standard thickness for gas piping has been determined from long experience. In trying to reduce the thickness we injure the tube. First, in mechanical strength, on account of the thinner metal, and second, in the joints which, if threaded properly, are liable to break, because of the metal cut away for the thread, and if not threaded deeply enough are liable not to hold in the coupling. Why, therefore, should not the same standard be adopted for electrical tubing as for gas piping?

Assuming that iron tubing, similar to standard gas pipe, is to be used for the raceway, and ordinary rubber-covered wire for the insulated conductor, the main point to be considered is, How shall this wire be put into place without injuring the insulating material, and be kept from actual contact with the iron pipe? This can be done by some form of protecting material of moderate thickness, which will come between the iron pipe and the rubber covering of the

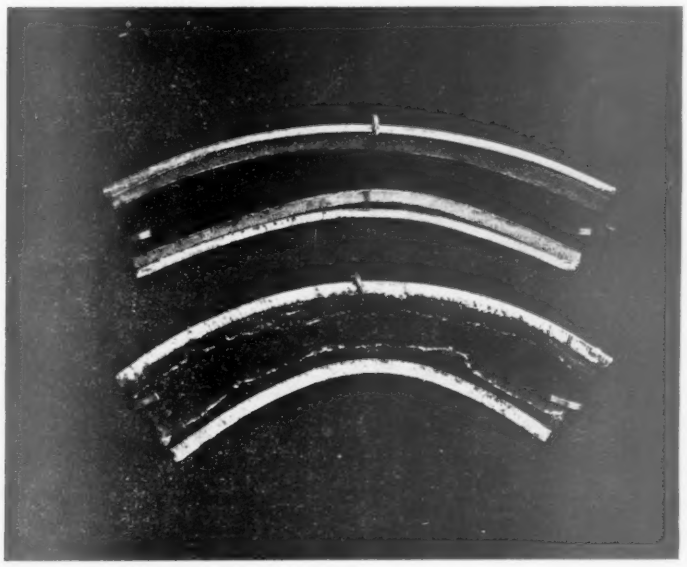


PLATE B.

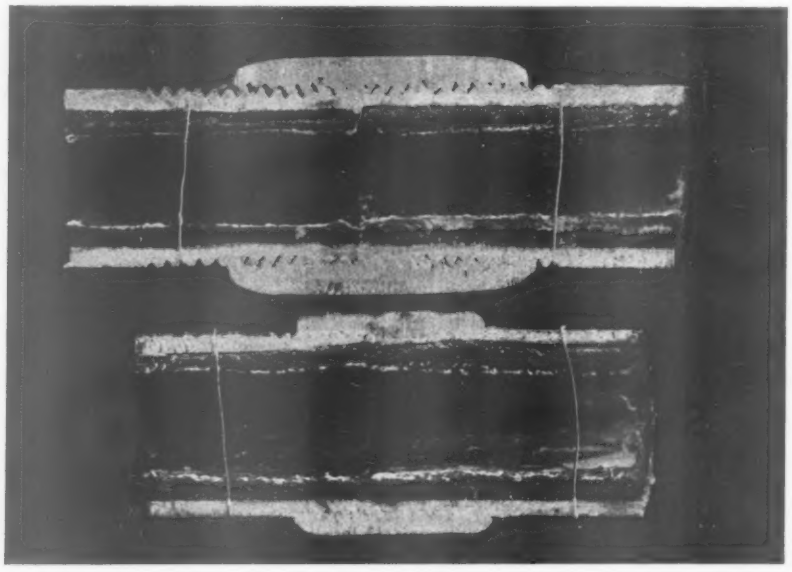


PLATE C.

wire, and which can be placed on the wire, or as a lining to the tube; the properties of this material, whenever placed, is a matter of importance if we wish to produce the best results.

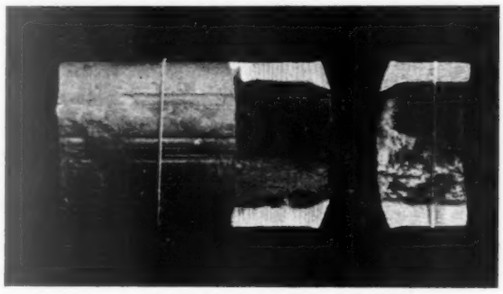


PLATE D.

With regard to the desired properties of this material:

1. It must bend without material injury.

2. It should not be injured by the absorption of moisture, for we must provide against the possibility that the tubes contain water at any point.

3. If used as a lining, it should present a smooth interior surface, and as a covering, a smooth exterior surface, and offer as little resistance as possible to drawing in the wires.

4. If used as a lining, it should contain no chemical—acid or alkili—which would be dissolved by water and injure the insulation of the wire.

5. If used as a lining, it should not soften so much on heating as to run together, and when cooled freeze to the wire, rendering it impossible to remove the latter.

6. The insulating properties of this material should be of advantage, although the material is not depended upon for the main insulation. This is especially important, due to the rapid development in the use of higher potentials that is likely to occur during the next few years.

7. It should not be subject to easy

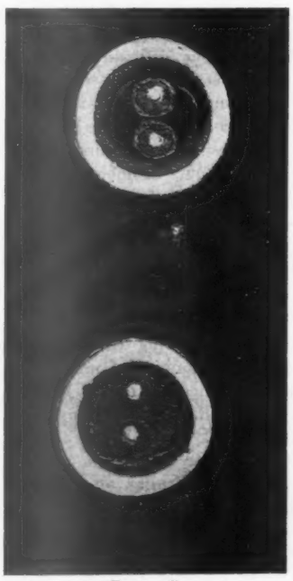


PLATE G.

abrasion by the use it will ordinarily be put to.

In order to discuss intelligently whether this protecting material should be a covering to the wire or a lining to the tube in order to best protect the wire, let us consider first the causes from which injuries to the rubber covering of the wire and to the wire itself are likely to occur. These are:

1. Stretching and drawing out the copper conductor, thus reducing the size of the wire by pulling in against excessive resistance. 2. Stretching the rubber covering enough to rupture the rubber by excessive resistance when drawing in the wire. 3. The actual cutting of the rubber covering by projections on the interior surface of the iron tube, such as burrs, fins, etc.

The following points may almost be considered axioms: 1. That all iron pipe will have burrs raised on the interior surface by the cutting-off tool, which will not be removed entirely by the ordinary workman that must of necessity be employed on the work. 2. Iron pipe will have fins and other projections more or less sharp on their interior surface. If the tubes are specially reamed out for the purpose, and if every tube used is carefully examined in a good light by a competent man, it might not be necessary to consider this latter point, but such conditions are almost impracticable.

The main advantages and disadvantages of the separating material on the wire or lining the tube can be stated as follows:

With the separating material on the wire the advantages are: 1. The tube can be bent somewhat easier.

The disadvantages are: 1. The friction of drawing in is increased on account of the increased outside diameter of the wire. The wire will bend with greater difficulty in passing around corners and will tend to stick more on all surface roughnesses.

2. The burrs, fins and other roughnesses that will surely be found on the interior surface of the tube will catch in the wire and hold until the covering is torn, and thus enormously increase the resistance of drawing in. This will render the wire liable to injury from stretching, which may be sufficient to rupture the rubber covering. In practice it is a well known fact that when drawing in wires the workman will expend all his force before starting fresh, and usually will break the wire before he will stop pulling.

3. If the burrs and fins on the tube be of sufficient length and sharpness they will cut through the protecting material into the rubber, and may actually penetrate as far as the copper itself.

4. Assuming the same thickness of the separating material in both cases, a larger tube will be required for the same size of copper when the protecting material is on the wire than when it is a lining to the tube. This is because the clearance that should be allowed for the wire is a percentage of the outside diameter of the wire; therefore, as the outside diameter of the wire is greater when this extra covering is on the wire, the clearance must be greater, therefore the tube itself must be larger.

With the separating material lining the tube, the advantages are:

1. The fins and other projections on the interior surface of the tube will either be removed before the lining is inserted, or will be covered by the lining.

2. It is thoroughly demonstrated in practice that while the ordinary workman will not remove completely the burr raised in cutting off the tube, he will remove the greater part of it,

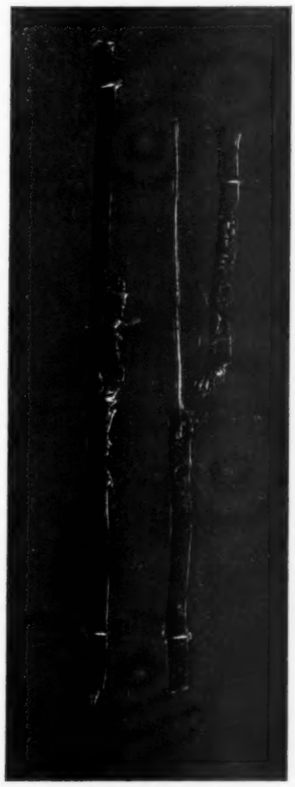


PLATE E.

and the lining in the tube will be thick enough to come above the remaining burr and keep the wire away from it.

3. From these two facts, and because of the smaller diameter of the wire, the friction of drawing in will be greatly reduced, and the wire and rubber covering will not be so liable to injure from stretching.

4. If, in an exceptional case, the burr stands up sufficiently high to actually cut the rubber covering of the wire, the result will not be so bad when the tube is lined, because the injured points will be protected by the lining of the tube which itself serves as insulating material. When the extra covering is on the wire any portion that may be injured might be directly against the iron of the tube.

5. The smaller outside diameter of the wire renders it easier to handle, which is an advantage so long as the thickness of the rubber is sufficient to insure sufficient insulation resistance.

The illustrations give some idea of the conditions met with in actual practice; they are from photographs taken from specific cases and speak for themselves:

Plate A shows several kinds of tubing; No. 1 is a special form of sheet tubing; No. 2 is one of the latest forms of thin steel tubing; Nos. 3, 4 and 5 are all samples of iron gas-pipe tubing, lined with wood, paper and tar, and rubber, respectively.

Plate B shows sections of two gas-pipe tubes cut after bending; No. 1 is lined with rubber; No. 2 is lined with paper and tar.

Plate C shows longitudinal sections through joints in a gas-pipe tube.

Plate D shows a section of gas-pipe tubing after cutting a length, illustrating the burr which is raised by the cutting tool.

Plate E shows the effect of drawing a rubber-covered wire over a burr in the pipe when it was necessary to use considerable force to overcome the resistance against drawing in. Fig. 2 shows how the rubber covering was loosened from the wire for some distance in length and afterwards actually stripped off. This brings out forcibly the point that excessive friction, in drawing wires in, will

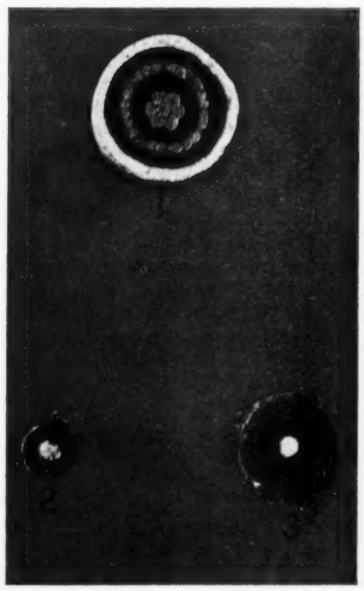


PLATE F.

loosen the rubber from the wire, the tendency of which will be to rupture the rubber long before the wire will break.

Plate F shows samples of wires with different coverings showing relative diameters. No. 1 is a large concentric lead-covered cable; No. 2 is the ordinary rubber-covered wire with no additional protection; No. 3 is a rubber-covered wire with a protecting exterior covering.

Plate G shows ordinary gas-pipe tubing, lined with paper and tar, showing the effect of heating the wire, on a vertical rise, sufficiently to soften the tar so that it runs down; No. 1 shows the normal condition; No. 2 shows the wires "frozen" in place after tar has melted, run down and cooled. It is evident that in this case wires could not be removed after such action had taken place.

To conclude, it is the general opinion of the writers that lining the tube with an insulating material, which, however, should only be depended upon for protection, is the proper thing to-day, but that should iron tubes be made so that burrs and fins are eliminated with absolute surety, then unlined tubes will become suitable and will be used.

THE BERLINER PATENT CASE.

MUCH INTEREST IN THE NEW STATE OF TELEPHONE AFFAIRS RESULTING FROM THE DECISION—OPINIONS OF OPPOSITION COMPANIES—WHY TWO JUSTICES DID NOT SIT IN THE CASE—PROBABLE POLICY OF THE BELL COMPANY.

The decision of the United States Supreme Court in the Berliner patent suit, so fully reported in the ELECTRICAL REVIEW last week, has awakened renewed interest in telephone matters, not only on the part of the telephone companies affected, but by the public in general. The stock of the American Bell Telephone Company on the Boston exchange marked an advance of nearly $10 a share on the receipt of the news. It is believed in some quarters that the victory of this company will have more significance to stockholders of the company than simply to prolong the life of its patents. Now, for the first time, the American Bell Telephone Company is no longer under legal fire, and it is possible that the company may wish to make a division to its stockholders of some of its treasury assets. This matter was talked of some years ago, but nothing was done. It is thought that if such a distribution was made, it would be in shares of the Long-Distance Telephone Company, the distribution of which stock the parent company is apparently free to make. As the parent company put no money into long-distance construction, says the *Wall Street Journal*, from month to month it takes stock in the Long-Distance company, which stock is all in the Bell company treasury, and the treasury stock now amounts to about $14,000,000, or 50 per cent per share on Bell capital stock.

The Berliner decision fully covers 40 pages of type-written manuscript, and it will be some days before the printed copies are ready.

Judge Gray did not sit in the case, because a remote relative of his held Bell telephone stock. Justice Brown took no part, because he did not hear the arguments. Counsel for the Bell Telephone Company say that there are a number of companies infringing the Berliner patent, and that they will be immediately proceeded against; one case in particular, the National company in Massachusetts.

People who do not think the Bell company will go into the telegraph deal say that Bell would have to build expensive lines west of the Mississippi, where Western Union makes no money, if it tried to compete in general telegraph business.

Western Union's interest in the telephone is confined to the New York Telephone Company and possibly one other.

Stockholders of the Bell company took 22,000 shares of the 23,650 shares offered at $214 per share, and the balance will be sold at auction.

THE OPPOSITION COMPANIES.

James McNaught, of the firm of McNaught & Redding, in reference to the decision by the Supreme Court of the United States concerning the Berliner patent, is reported as saying:

"The court did not pass upon any of the questions presented, except the one of fraud. The court held that the government had not shown sufficient fraud to warrant the canceling of the patent. As to the other points, Justice Brewer, in delivering the opinion of the court, said:

"'The other points set up by the government were equally open to any person aggrieved by the issue of the patent, but were not sufficient to justify the court in canceling the patent in this proceeding.'

"The questions as to the validity, priority and scope of the Berliner patent by this decision are left open, and can only be settled in infringement suits between private parties. The independent telephone companies claim that Edison, and not Berliner, was the first discoverer of the constant-contact, variable-pressure microphone. Edison made his discovery January 7, 1877; Berliner, March 14, 1877. It is also claimed that, under the decision in the Bate Refrigerator case, Berliner's American patent expired with his foreign patents. Many patent lawyers also claim that Berliner did not invent or discover anything; that he applied Bell's method of transmitting speech by undulatory currents to Reiss's old apparatus; that he adjusted the electrodes; that this involves mechanical skill only, and not invention. Independent telephone companies, therefore, will pay no attention whatever to this decision."

Among the opinions of the independent companies received by the ELECTRICAL REVIEW, in addition to those published last week, we present the following as specially bearing on the question of the attitude of the anti-Bell interests.

FROM THE STROMBERG-CARLSON COMPANY.

TO THE EDITOR OF ELECTRICAL REVIEW:

In response to your inquiry as to the effect of the Berliner decision on our business and the public generally, would say that, for our part, we are jubilant over the decision and we consider it a signal victory for the opposition companies for the following reasons, which certainly appeal to common sense, viz.:

The Supreme Court *refused to consider* the question of *validity* of the patent, in view of the 1880 Berliner patent and other defenses, thus compelling the Bell company to settle the vital questions relating to anticipation by a protracted infringement suit, which can not be settled for many years. The only court, Judge Carpenter, of Boston, who passed upon the question which will arise in the infringement suit, *decided against the Bell company, and it is reasonable to suppose that any other court considering the same questions will do the same thing.*

The Appeal and Supreme courts hold that these questions, which will arise in *an infringement suit*, could not properly be considered in a suit founded on fraud.

The Chicago *Record*, in an editorial of May 11, sums up the situation better than we can do it, as follows:

"The policy of the Bell company in evading a decision upon all the grounds of invalidity that had been raised—and thus throwing away an opportunity to gain a clear title to the invention if it had a right to it—seems to lend color to the claim of the independent telephone companies that the Bell company has really little faith in this patent, and that, instead of securing a judicial decision upon the merits of the case, it proposes to use the Berliner patent and the decision of the United States Supreme Court as a club over weaker corporations. In spite of all the claims that may be made by the American Bell Telephone Company and its agents and advocates, the decision of the Supreme Court of the United States is apparently of no practical value in continuing and sustaining the monopoly of the telephone industry."

As to the moral effect of the decision on public business, there is no question but that it will be more or less great until the public comes to learn that this is but another cloud the Bell company has shrewdly thrown over the industry. Nerveless and weak-kneed investors will undoubtedly take alarm for the time being, but this decision gives to those best posted wonderful opportunities to make telephones while the clouds hang low.

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY.
F. A. ROSS, General Manager.
Chicago, May 11.

FROM THE WILLIAMS-ABBOTT COMPANY.

The following special dispatch was received too late to publish last week:

Decision of the Supreme Court in the Berliner case can in no way detrimentally effect the progress of the independent telephone interests. We do not, in any way, regard this as a set-back to independent companies.

WILLIAMS-ABBOTT ELECTRIC COMPANY.
Cleveland, Ohio, May 11.

Electric Block Signal for Trolley Roads.

The Automatic Block Signal Company, of 136 Liberty street, is introducing a novel and ingenious automatic electric block signal that should interest both managers and patrons of single-track trolley lines, as it does away with the annoyances

ELECTRIC BLOCK SIGNAL FOR TROLLEY ROADS.

incident to cars going in opposite directions meeting between turnouts.

The illustration herewith shows the appearance of the box containing the signal. One of these boxes is placed on a pole near the turnout at each end of the "block", or section of single track. The box has two lenses on each side, the two upper lenses having green glass and the two lower ones red glass, with a group of lamps between each pair of lenses. Each box has wires running to automatic contacts on the in and out trolley wires of the switch. Two wires also connect the two signal boxes with each other.

The operation is as follows: The trolley wheel of a car on passing over the turnout to enter the block strikes the corresponding automatic contact which lights the lamps that show the green signal in the signal box at the entering end, and the red signal at the other end of the section.

On passing out of the block, or section, the trolley wheels strike the automatic contact on the "out" side of the turnout trolley wire and this shuts off the current from the lamps at both ends of the section. It will thus be seen that this block signal not only indicates at each end when a car is on the "block", but also the direction in which it is moving. These signals have been in use by the Paterson, N. J., Railway Company, and by the New Jersey Electric Railway Company, in Hoboken, since October, 1896, and are said to have given perfect satisfaction.

ELECTRIC RAILWAY NOTES.

The bondholders of the Johnson City & Carnegie Street Railway Company have applied to the courts at Knoxville, Tenn., for a receiver.

The new line of the Needham & Newton, Mass., Street Railway Company, running from Newton Upper Falls to Needham Centre, was officially opened last week.

The Metropolitan Railway, of which George Harries, of the Washington Metropolitan Railway, is an incorporator, has offered the city of Louisville, Ky., $75,000 annually for a franchise, and agrees to charge only a four-cent fare.

The Saginaw, Mich., Common Council has formally declared the franchises of the Consolidated Street Railway forfeited and revoked on all streets, and authorized the city attorney to proceed at once with the necessary legal steps to secure the ejectment of the company from the streets of the city of Saginaw.

The stockholders of the People's Street Railroad Company, the new electric line from Newburyport, Mass., to West Newbury, have elected directors as follows: Charles Odell, Salem; R. H Brown, Peabody; C. C. G. Thornton, Boston; C. H. Odell, T. H. Johnson, Salem, and Thomas Smith and A. R. Smith, West Newbury. Charles Odell was elected president, and R. G. Calef, of Newburyport, treasurer.

The Ocean Electric Company, of Queens County, N. Y., was incorporated on May 1 with a capital of $50,000. The company proposes to operate a street surface railroad five miles long, starting at Sheridan Boulevard and the village line of Far Rockaway. The directors are Daniel F. Lewis, Louis E. Robert and Henry R. Van Keuren, of Brooklyn; Samuel B. Lawrence, John B. Summerfield, William Chesebrough, Jr., Henry M. Haviland, Francis P. Lowrey and Armitage Matthews, of New York city.

Another hearing before the New York State Railroad Commissioners, on the application of the Metropolitan Street Railway Company and the New York & Harlem Railroad Company for permission to use the underground trolley on Fourth and Madison avenues, was held in the Chamber of Commerce last week. W. H. Page, representing the Third Avenue Railroad Company, opposed the granting of the application, and John Harsen Rhoades presented additional names of residents along the route who object to the proposed change of power. The hearing was not concluded yesterday and will be resumed on May 20.

PRACTICAL TALKS FOR ELECTRICAL WORKERS.

BY B. F. FELLS.

A good deal of judgment is involved in the science of running electrical machinery to best advantage. Increased speed above that given by the makers of the machine always leads to faulty work. The limit is usually given by the builders. I present a few drawings to show some effects of too high speed on the gears of an electrical machine which we have had running in our shop. A year ago the cogs of the gears were true and meshed full, as shown in Fig. 1. We increased the speed beyond the capacity, and in less than a year the cogs were worn as shown in Fig. 2, resulting in a rough and unsteady motion. The bearings were also worn. We remedied the latter by babbiting. Before using babbit metal the shaft must be cleaned of all dirt and grease and slightly warmed, as this metal sets fast, and would be of no use applied to a surface of cold iron. A good way to heat the shaft and clean it at the same time is to swab it with boiling water in which some soda ash or sal soda has been dissolved.

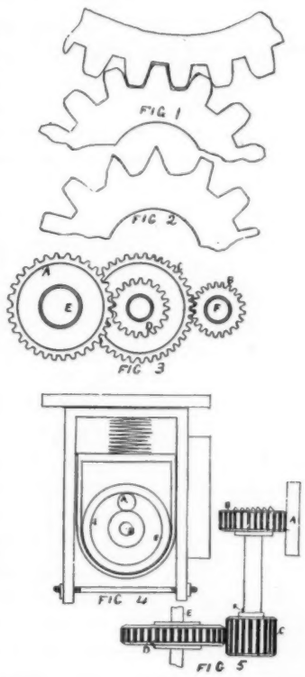
In some types of electrical apparatus a system of gears exists like that shown in Fig. 3. Each gear turns a steel roller shaft, and to find out how much quicker the surface speed of one roller is than the other is done by finding the surface speed of each and dividing one by the other. Example: In Fig. 2 let A=40 teeth, D=15, C=30, B=20, the diameter of the roller E=1½ inch, and diameter of F=1 inch. The problem is to find how much quicker or slower the surface speed of F will be compared with that of E. A will be the driver.

First find the revolution of B for one of A: $\frac{A\times C}{D\times B}=\frac{40\times30}{15\times20}=\frac{1,200}{300}=4$ revolutions of B. Next find the surface speed of E: 1½ inch×3.1416=4.71. The surface speed of F=4×1×3.1416=12.56 inches. Now, $\frac{12.56}{4.71}$=2.66, so that the surface speed of F is 2.66 times quicker than E, or there is that much of a draft between them.

The friction on the teeth of gear wheels, fairly put up and finished, is from one to three per cent. To reduce friction as much as is possible in motor shafts and shafts of other electrical machinery, the style of box bearing, shown in Fig. 4, can be fitted by any mechanic. The axle journal *a* of the wheel or shaft bears and rolls against the upper part and inside of a circular shell *e*. The bearings *b* of this shell are attached to the castings, and this to the machine against the springs at the top.

This arrangement allows the axle to revolve freely, and the releasing shell *e*, as the intermediate part, revolves in the same direction. The bearing of the shell in the box has to bear the pressure, but the leverage from the axle bearing to the radius of the shell bearing acts like a lever, the action being on the long end, the resistance of the shaft bearing being easily overcome; consequently, the pressure caused by the weight of the shaft and related parts is reduced to its minimum.

The knock-off clutch arrangement is now applied to certain classes of electrical machines where it is advisable to have a means whereby the machine may be quickly stopped automatically. A view of this device is given in Fig. 5. There is a bottom roller *a*, on which a worm is placed, working with the change gear *b*; *c* and *d* are permanent gears having male and female pieces *e* and *f* fixed on them. When the box is started, *e* and *f* are placed in contact, so



DIAGRAMS ILLUSTRATING "PRACTICAL TALKS FOR ELECTRICAL WORKERS".

that *f* pushes *e* outward, thereby throwing out a spring, which automatically stops the box; *e* and *f* do not again come in contact after the box is started until *c* has made a certain number of revolutions, determined by the ratio of *c* to *d*. Just how many revolutions *c* will make can always be determined by one rule: Divide the number of teeth in *c* into those of *d*, and take the whole number in the result and multiply the number of teeth in *c* by it; the result will be the number of revolutions for the given ratio, providing *c* has an odd number of teeth and *d* an even number. The journal, on the side where the belt shipper is located, is provided with a crank, which comes against the shipper when the side of the trough is turned outward on its pivot, and dislodges the shipper from its notched holder; the rod and belt guide are thus thrown to the left by the action of the crank, and the belt is shifted from the fast pulley to the loose one. Thus we have an effective automatic stop motion.

On all generators the points to be most carefully watched are the fallers, distance of back rollers from the fallers, saddles on which the fallers travel, and the conductors for guiding the fallers. The two last-mentioned are often the source of considerable trouble, if not constantly watched and kept in repair. They should be made of steel and case hardened, the ends should be perfectly square, with the face and the corners rounded a little. When the fallers are "locking fast", the saddle is generally at fault, and it is no economy to keep fixing the fallers to their proper position again and start up in a hurry; that kind of "hurry", though very popular, pays no one. I heard some one say that he has a generator which has a fit of "locking" every so often, and he can't find out what is the matter with the thing. Possibly one screw may be traveling a little ahead of the other, owing to one of the gears having moved a little on the shaft. More often one saddle has worn shorter than the other. If so, the saddle should be taken out and made the right length. Sometimes a conductor becomes stuck and does not keep to the faller, as it is rising and falling. A conductor has its work to do, and if kept in good condition will save much trouble. The man who works on the makeshift plan is always in trouble. My final suggestion is to keep things up and in good order.

The Exhibition at the Street Railway Convention.

The following is an abstract of a recently issued circular signed by president Robert McCulloch and secretary T. C. Penington, of the American Street Railway Association:

The American Street Railway Association will hold its sixteenth annual convention at Niagara Falls on Tuesday, October 19, 1897, continuing in session four days. The exhibits and displays of the supply men are so important a part of our conventions that the executive committee, in making arrangements for the meeting, have been as mindful of our wide-awake allies, and as zealous in providing for their convenience and accommodation as for any other feature of the gathering. We have held an executive session at Niagara Falls, and give you in this circular the substance of the arrangements we have made in your interests.

A commodious exhibit hall, 120 by 154 feet, is now being erected in the center of the city and very near all the hotels. The steam railroad tracks are now within 200 feet of the building, and we secured an agreement to have these tracks extended directly to the building, thus saving to the exhibitors all charges for cartage. A side track will be laid in front of the hall for cars, sweepers, etc. The convention will be held on the second floor of the exhibit hall, all stairways leading up from the inside, thus insuring the attention of all delegates and visitors to the exhibits; the entire hall is to be lighted and heated during the entire presence of the exhibits. Written agreements have been secured that all the hotels will be kept open and that their rates will not exceed the usual prices.

The income from sale of space will go to the American Street Railway Association. The executive committee of the association has fixed the price at 10 cents per square foot, and ruled that no space of less than 100 square feet will be assigned, but applicants may have as many multiples of this quantity as they may wish, all in one body. Payment for space should be made to Mr. T. C. Penington, secretary and treasurer of the American Street Railway Association, 2020 State street, Chicago, Ill., on or before October 1, 1897. Application for space should be made to Mr. H. W. Beardsley, chairman committee on exhibits, Niagara Falls, N. Y. We hope to have you with us with an extensive display.

Space must be applied for by September 1. Assignments will be made as promptly as possible after that date and exhibitors notified of their location. Exhibits of like character will be grouped together, and space will be assigned in the order of application.

It is earnestly requested that all exhibits shall be in place and all work finished by Monday evening, October 18, which is the evening prior to the opening of the convention. Possession of the hall can be had on Monday, October 11, thus giving ample time for preparation. Watchmen will be in charge of the premises, so that exhibits will be safe.

If the supply-men so desire, and will designate one of their own number who will be willing to go to Niagara Falls at some short time previous to the meeting, and whose necessary expenses they will defray, the executive committee will invest him with the requisite authority to supervise the reception and placing of displays. He can arrange with local carpenters, lumbermen, etc., to the effect that there may be no unfair charges for services or material that may be necessary in arranging exhibits.

The executive committee found the Niagara Falls and Buffalo brethren so enthusiastic as to the coming meeting, and so hospitable and seductive in their greetings that success is assured, the location being central and accessible, and the natural attractions wonderful beyond description, and the inquiries and information already received being so encouraging, an unusually large attendance seems guaranteed.

The annual dinner will be held at the International Hotel, Thursday, October 21, at eight o'clock P. M. Tickets will be sold at the actual cost to the association. The railroads will sell tickets on the certificate plan.

Queen Victoria to Touch the Button.

A press dispatch from Montreal states that Queen Victoria has been asked, through Lord Aberdeen, and her consent is expected, to touch a button in London and thus start the big electric works of the Lachine Hydraulic and Land Company, which is to supply some hundred thousand of horse-power to Montreal.

Eighty miles of conduits have been laid, and arrangements have been completed with the Commercial Cable Company for the event. This is the largest electric installation in the British dominions.

Future of The Steam Locomotive.

[*From the New York Tribune.*]

One swallow doesn't make a Summer, and one railroad train run by electricity doesn't abolish steam locomotives. Yet it has been observed that Summer usually does come with or soon after the first swallow.

Electrical Review

Times Building, 41 Park Row,

P. O. Box 2339. NEW YORK.

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REGISTERED CABLE ADDRESS:
"ELECTVIEW," NEW YORK.

1546 "CORTLANDT," TELEPHONE CALL.

WESTERN OFFICE:
CARL E. KAMMEYER, Representative,
1627 MONADNOCK BLOCK, CHICAGO.

LONDON OFFICE:
HENRY W. HALL, Representative,
42 OLD BROAD STREET, LONDON, E. C.

News, Subscriptions and Advertisements.

Subscription to the
ELECTRICAL REVIEW.

One Year, United States and Canada, - $3.00
One Year, Foreign Countries, - - 5.00
Single Copy, - - - - - - - .10

Copies can only be supplied for one year back at 25 cents each.

Special Notice to Advertisers.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue.

NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

NEW YORK, MAY 19, 1897.

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The Niagara Falls convention of the National Electric Light Association will be held June 8 to 10, inclusive.

In this issue of the ELECTRICAL REVIEW will be found an interesting contribution from Messrs. Charles H. Davis and Howard C. Forbes on "Tubing For Interior Electric Lighting Wires". Naturally their viewpoint is that of the engineer, from whom, however, the manufacturer is always willing to learn.

ELECTRICITY ON ELEVATED ROADS.

About two years ago the ELECTRICAL REVIEW published an interview with the late Colonel Hain, general manager of the elevated railways in New York city, which caused considerable comment at the time. In the interview with our reporter, Colonel Hain said that the elevated roads would not introduce electric traction either "next year or during the next two or three years". Some of the daily papers then asserted that Colonel Hain was not speaking as an engineer, but was merely reflecting the views of an ultra-conservative element in the directorate of the company. We believe that this may have been true, and suggest that the time limit set by Colonel Hain has nearly expired.

As bearing on the case in New York city, it is interesting to observe that the Kings County Elevated Railroad, of Brooklyn, N. Y., is experimenting with the Sprague system of electric traction, with a view to adopting it should it prove successful. This company will ultimately send its cars across the Brooklyn Bridge to connect with the New York elevated system, forming an important link in the rapid transit facilities of Greater New York. President William Berri, of the Brooklyn Bridge, is even now considering the plans of the Kings County company for crossing the bridge by means of electric traction.

The success of the electric elevated road in Chicago is admitted, both as to economy to the road and convenience and comfort for the traveling public.

The third-rail system was originally demonstrated a success at the World's Fair in Chicago. Later it was adopted and successfully used on the elevated railroads of Chicago. Later still it has been adopted and proved successful on one or more branches of the surface lines of the New York, New Haven & Hartford Railroad. Meantime it has intrinsically been a boon to the throngs on the Brooklyn Bridge. It can be just as successfully installed on the elevated railways of New York, and it is time it was done.

In view of all these facts, it is difficult to see how the conservatism of the Manhattan Railway Company can hold out much longer against the adoption of electric power, which, it has been estimated, would result in a saving in operating expenses alone of about $1,000,000 per annum. The traveling public of New York city are famous for their ability to stand discomfort and the other annoyances of inadequate service, but the old adage about the worm may apply here.

We understand that the Rogers printing telegraph system is to have a 30-day practical test on the lines of the New York Central Railroad between New York and Albany. This system prints the message directly at the receiving station.

Business conditions throughout the country continue to improve slowly but surely. The electrical trade has picked up wonderfully during the last few weeks, and the majority of business men in the field speak with encouragement and hopefulness of the outlook.

The bicycle seems determined to become a competitor of electrical progress in one way or another. It is now reported that the supply of natural rubber is running short, owing to the increasing demand for pneumatic tires. If this is true, what is the insulated wire manufacturer to do?

Any one of our modern war vessels is a most striking illustration of the indispensable position, the all-pervading importance, of the electric current. It is used for a multitude of purposes on board these vessels, and in each case is so perfectly adapted to the work that no other agency could now take its place. The fighting efficiency of war vessels has been increased wonderfully by the adoption of electrical devices on board.

Among other useful applications of the electric current is one which has in it the germ of especial humanitarian utility; namely, the control and operation of a system of automatic signals on single-track trolley roads. A recent collision in Brooklyn aptly shows the desirability of some system of safety signals, and we hope managers of single-track trolley roads will awaken to the necessity of preventing repetitions by adopting some safety system of electric signals.

In view of the improvements in gas lighting appliances, it might be well for some of our investigators, who are equipped for the work, to make an effort in the direction of increasing the efficiency of the filament in incandescent electric lamps. Apart from details of manufacture, the improvements in this direction have been comparatively slight of late years. Ultimately something in the nature of the Tesla glow lamp may occupy the field; but at present there is a fine field for a two-watt lamp. Such a lamp would heavily increase the earning power of our lighting stations and help cheapen the light to consumers.

FORT WAYNE LAMP COMPANY.

MESSRS. M'DONALD AND INSULL ENTER THE INCANDESCENT LAMP FIELD.

Mr. R. T. McDonald and Mr. Samuel Insull have arranged for the organization of the Fort Wayne Lamp Company.

The factory of the Adams–Bagnall company, Cleveland, Ohio, will be purchased for the use of this new company, which is formed for the purpose of manufacturing incandescent lamps.

The alliance between the Fort Wayne Lamp Company and the Fort Wayne Electric Corporation will be a very close one.

The new company will enter the incandescent lamp field with every facility at its command for manufacturing lamps on a large scale and of the highest quality.

Turning the Tables.

Coming on the heels of the Berliner decision, and the recent defeat of the Watson and Roosevelt switchhook patents by the Western Telephone Construction Company, it will be interesting to learn that this company has instructed its attorney to immediately bring suit against the American Bell Telephone Company, the American Telephone and Telegraph Company and the Western Electric Company for alleged infringement of patent No. 581,350, issued to J. E. Keelyn on April 27, 1897. The patent covers an improved construction of telephone receivers, designed to insure permanency of adjustment between the magnet and diaphragm of a receiver. It is claimed by the owners of the patent that the last form of telephone receivers used by the defendant companies is covered completely by this patent. This is the first case on record, as far as known, where a so-called opposition company has taken the initiative in any patent fight with the Bell company or its allies.

Canadian Electrical Association.

The seventh convention of the Canadian Electrical Association will be held in Dufferin Café, Queen Victoria Park, Niagara Falls, Ont., on June 2, 3 and 4. A large number of social features have been provided. The programme of papers to be read is as follows:

"Day Loads for Central Stations and How to Increase Them," by J. A. Kammerer, Toronto.

"Submarine Cables—Dealing more especially with the Actual Experience in Cable-Laying and Maintenance in this Country," by D. H. Keeley, Ottawa.

"Determination of the Heating Power and Steam Producing Value of Coal from a Preliminary Examination," by Wm. Thompson, Montreal.

"Water-Driven Plants," by John Murphy, Ottawa.

"The Commercial Aspect of Electric Railways," by C. E. A. Carr, London, Ont.

"Accumulators: Their Application to Central Station Lighting and Power," by W. A. Johnson, Toronto.

"Why Some Lighting Plants Do Not Pay," by F. C. Armstrong, Toronto.

"Steam End of an Electric Plant," by A. M. Wickens, Toronto.

PERSONAL.

Mr. C. E. Bibber, of the Bibber–White company, Boston, visited New York city last week.

Mr. G. A. Kittredge, president of the Bombay, India, Tramway Company, arrived in New York city last week.

Mr. J. Frank Clarke, of the Electric Storage Battery Company, Philadelphia, spent a day or two in New York last week.

Mr. Charles R. Huntley has been appointed a park commissioner of the city of Buffalo, N. Y. Mr. Huntley will adorn the position.

Mr. Charles A. Coffin, president of the General Electric Company, has removed his legal residence from Lynn, Mass., to New York.

Mr. H. M. Byllesby, of St. Paul, who is well known in electrical circles, is stopping in New York city for a few days at the Holland House.

Prof. E. G. Acheson, president of the Carborundum Company, of Niagara Falls, N. Y., has sailed for Germany to establish a manufacturing plant similar to the one at Niagara Falls.

Mr. C. A. Ross, formerly of Kansas City, will hereafter efficiently represent the Sawyer–Man Electric Company at Chicago, with headquarters at 171 La Salle street. Mr. E. H. Allen has resigned from the Chicago office.

Mr. W. A. McKenney, of the electric fixture house of McKenney & Waterbury, Boston, spent one and one-half day in the Metropolis last week and did two weeks' work in that time, and returned to the Hub to look after the filling of secured orders for furnishing 13 new Boston buildings.

D. B. Martin, manager of passenger traffic of the B. & O. Railroad, is a firm believer in artistic advertising for railroads, and is already taking steps to place the B. & O. at the top in this respect. He is going to take full advantage of the scenic beauties of the line, and probably an entirely new series of photographs will be secured.

Mr. C. H. Wilmerding announces that he is about to sever his connection with the Chicago Edison Company as general superintendent, a position which he has held for four years, and that he will open an office in Chicago as designing, constructing, supervising and consulting engineer. Mr. Wilmerding's previous experience admirably fits him for his new field of work, in which the ELECTRICAL REVIEW hopes he will achieve eminent success. Mr. Wilmerding was for five years general manager of the Chicago Arc Light and Power Company, and for nine years president of the Chicago Sectional Electric Underground Company. He has also had experience in civil and mechanical engineering undertakings, and is an ex-president of the National Electric Light Association.

Election of General Electric Directors.

The annual meeting of the General Electric Company was held at Schenectady May 11, and the old board of directors was unanimously re-elected. At the meeting 210,000 shares were represented.

TELEPHONE NEWS AND COMMENT.

The Erie Telegraph and Telephone Company made a net gain of 174 subscribers during April, making the total number connected May 1, 22,358.

The Home Telephone Company exchange, at Wabash, Ind., has been badly damaged by fire. The loss is heavy, as service to telephone patrons will be interrupted for a week or more. The loss is covered by insurance.

At Staunton, Va., a rate war is on between the local Bell company and an opposition company which has been doing business since August, 1895. At present the Bell company is furnishing telephones to subscribers at the rate of 50 cents a month.

A trust mortgage for $500,000 from the Home Telephone and Telegraph Company, of Baltimore, to the Maryland Trust Company has been recorded. It is to secure the issue of 500 gold bonds of $1,000 each, dated November 2, 1896, and running 20 years, with six per cent interest. The mortgage covers all the property and franchises of the Home company.

At the annual meeting of stockholders of the Mexican Telephone Company, held in New York city on May 12, the present directors were re-elected. Mr. Charles A. Browne, of Boston, was elected president; W. French Smith, of Boston, treasurer, and James Cooney, Jr., of Boston, secretary. One hundred thousand shares of the total 180,000 were represented.

The York, Pa., Telephone Company has recently contracted through Paul W. Bossart, manager and representative of the American Electric Telephone Company, of Chicago, for central office apparatus sufficient to accommodate an increase of 200 subscribers over its present complement of patronage. With this addition the company is capable of furnishing service to 700 subscribers, each having a single wire.

Automatic Telegraphy.

An interesting exhibition of the Weiny–Phillips automatic system of telegraph, invented by R. H. Weiny and Walter P. Phillips, was given on Sunday, the 9th inst., in the Postal Telegraph Building, New York city, in the presence of representatives of the leading daily papers of New York and Philadelphia, when the advantages of the invention was clearly observed. In an early issue of the ELECTRICAL REVIEW we expect to be able to give an account of the exhibition in detail, illustrated by diagrams of the system.

Of the $178,000 convertible debenture certificates of the Edison Electric Illuminating Company of Boston outstanding on the 30th ultimo, $168,000 have availed of the privilege of conversion into stock. The Edison directors have voted to extend the time in which conversion of the remaining convertible debentures can be made to June 1, 1897.

AN AGREEABLE COMPLIMENT.

The ELECTRICAL REVIEW is contentedly busy recording new names on its swelling subscription list and presenting electrical occurrences of interest and importance promptly and completely. It is hardly necessary to call attention to the thoroughness with which this is done or detail how extensively the work is appreciated, but it does not seem out of place to publish, out of several score received, the following pleasant compliment from a Chicago subscriber, who is discerning and watchful, and whose kind opinion is highly appreciated in this office:

TO THE EDITOR OF ELECTRICAL REVIEW:

It seems to be rapidly dawning on the electrical people here, to judge from the many favorable expressions heard, that the ELECTRICAL REVIEW is not only a real *newspaper*, but generally "gets there" before any of its esteemed contemporaries.

It is unnecessary for me to tell you that I consider this week's "scoop" [the Berliner case] the biggest in recent years.

Chicago, May 15.

POLICE TELEGRAPHERS MEET.

EXECUTIVE COMMITTEE OF THE INTERNATIONAL ASSOCIATION IN SESSION.

The executive committee of the International Association of Police and Fire Telegraph Superintendents met last Saturday at the Clarendon Hotel, Brooklyn. This association was organized last September, and Mr. Frank Mason, superintendent of police telegraph in Brooklyn, was elected president. Those who attended the meeting included William Y. Ellett, of Elmira; John W. Aydon, of Wilmington, Del.; J. F. Zuleff, of Paterson; Brown F. Flanders, of Boston; H. F. Blackwell, of Brooklyn; S. L. Wheeler, of Springfield, Mass; William Brophy, Boston; Adam Bosch, Newark, N. J.; Fred Pearce, New York; R. W. Gordon, New York; W. L. Candee, New York; F. C. Mason, Brooklyn, N. Y., and Morris W. Mead, Pittsburgh.

President Mason welcomed the visitors. It was decided to accept the invitation to visit Nashville, Tenn., for the next convention, and Tuesday, September 8, was decided upon, this being the date that the old-time telegraphers and the United States military telegraphers will meet at the same place. The report of Treasurer Bosch shows the association to be in a good financial condition and steadily growing in numbers. J. W. Aydon, of Wilmington, Del., was elected a member of the executive committee.

OBITUARY.

Horace A. Pinkham, 72 years old, manager of the American Electric Company, of Boston, Mass., was struck by an inward bound train on the New York, New Haven & Hartford Railroad, in Wollaston, Mass., on May 15, and died from his injuries.

"Hints to Passengers."

The man who had studied grammar once and was not particularly ashamed of it boarded a Westport car at Twelfth street and began in an absentminded way to read the signs, says the Kansas City *Star*. He ran his eye languidly along the row of placards and back again; then began at the first and repeated. It was tiresome, but there was positively nothing else to look at, and he swore in excellent English, albeit—that he would never buy an article that he saw there advertised.

The car stopped at Fifteenth street to let on a fat woman and three negroes. The man who had studied grammar ran his eye down the line of placards again. He was bored.

Suddenly he started—a gleam of triumph in his eye.

"Conductor," said he, "do I have to do what that card says?"

"No, you don't have to."

"What would happen if I didn't?"

"Well, if you jumped off while the car was running and got hurt, why you couldn't collect damages from the company."

"So if I want to collect damages I have to obey that sign?"

"That's it."

The fat woman stared and the negroes grinned comprehensively. I wondered what was up.

The car switched around a bend.

"Conductor, I have business on Twenty-seventh street," said the grammarian.

The car stopped there.

The grammarian sat immovable as the sphinx.

"Well, this is Twenty-seventh street," said the conductor.

"Well, I supposed as much."

He did not move.

"Come! Hurry up!"

"Well, I'm ready. I'm waiting to see how you go about it. Do you lift me off the seat while the gripman pulls the car out from under me?"

The fat woman got up and walked to the further end of the seat.

"Or do you open up the floor of the car and allow me to stand on the track while the car is pulled away?"

The negroes began to show the whites of their eyes. Still I wondered.

"See here!" said the conductor. "What—are you crazy?"

"Not in the least," said the grammarian. "I am simply trying to conform to the rules of your company. Now, my friend, do you want to earn from your employers a medal for scholarship? No? Well, I will do this much for your benighted mind and charge you nothing for it. That sign up there reads: 'Passengers must not get off the cars while in motion.' That is wrong. It should read this way." And he wrote upon a pad:

> Passengers, while in motion, must not get off the cars.

"You see, that other is an awkward construction."

"It is, is it?" replied the conductor. He was mad, and we all saw it.

"Well, I'll tell you a thing or two.

Grabbing the pad, he wrote: "Passengers must not, while in motion, get off the cars."

He shoved it under the nose of the grammarian.

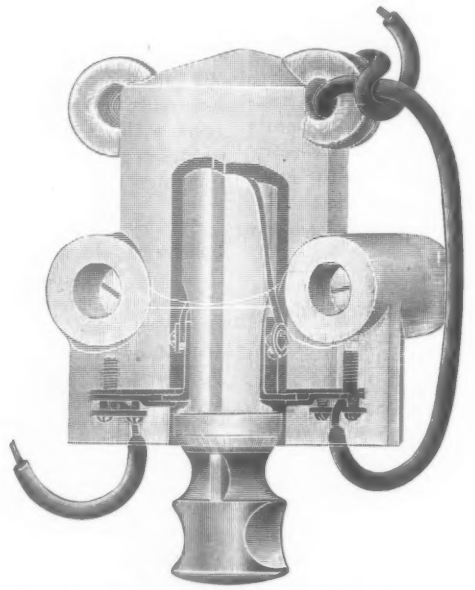
"How do you like these?" he shouted.

The man's hair stood on end. The negroes grinned. I stepped out onto the platform.

"You blank, blank idiot!" began both the conductor and his man together. That was all I could distinguish of the balance of the conversation. The remainder was a heterogeneous combination of motions, cars, passengers, whiles, otherwiles, afterwhiles, beforewhiles and a long train of expletives, which floated out into the open air. I fled.

"P. & S." China Junction Box and Motor Cut-Out.

The accompanying illustration shows one of the latest electrical specialties manufactured by the well known porcelain house of Pass & Seymour, Syracuse, N. Y. It is an all china junction box and motor cut-out. It may be fastened to its support either by lag screws or wood screws, and is suitable for use as a motor cut-out on 500-volt circuits, junction-box transformer, telephone cut-out, outside of buildings on service lines, and in any location where a cut-out is desirable. The service wire may be fastened in one of the eyes as shown in the illustration, thus saving the cost of an insulator.



"P. & S." China Junction Box and Motor Cut-Out.

The fuse chamber is entirely surrounded by porcelain and is completely divided by means of projections on the plug. It gives plenty of room for the fuse and takes a five-inch fuse. The plug is held in the box by means of the knife contacts shown in the cut, and can not drop out. The connections will take wire from the smallest to No. 4.

The Nassau Electric Railroad Company was mulcted in the sum of $10,000 in the Supreme Court, of Brooklyn, N. Y., in the suit brought by Mrs. Elizabeth Hartmann for injuries received in a collision between a trolley car and a milk wagon.

Electrical Power from the Nile Cataracts.

In connection with the suggestions of Professor Forbes, under the consideration of the Egyptian Government, to utilize the water power of the second Nile cataract, we have made some further investigation of the scheme, the works of which have now been in hand for two years, for utilizing 16,000 B. H. P. of the power in the falls of the Rhine at Rhinefelden, says the London *Electrical Review*. There is some similarity in the conditions of the two rivers, except that at the time of mean low water in both, the volume of the Nile is at least three times that of the Rhine, while at high water the volume of the former is at least 18 times that of the latter. The rise of the Rhine is intermittent; for instance, during February of this year, an abnormal rise occurred which caused an unforeseen interruption in the work in hand. The recurrence of the rise of the Nile at the same time each year may be counted on, though the height may vary as much as between 6 and 10 metres. The banks of the Rhine are alluvial with a rocky limestone bed, easily quarried. At the Nile cataract the river bears a reef of the hardest crystalline formation, and the banks are of the same formation, filled in with drift sand from the desert. The fall at Rhinefelden partakes of all the characteristics of a cataract or rapid, the incline of the bed having an average of about 1 in 150. Under the conditions above described, it may, we think, be fairly estimated that to utilize the Nile at all it will require works of at least five times the scale of those now in progress at Rhinefelden, and that *pari passu* it would not be worth while considering the details of any scheme to do so, unless a demand for $5 \times 16{,}000 = 80{,}000$ B. H. P. could be anticipated.

The Montreal Street Railway Company has decided to issue $500,000 of new stock instead of $1,000,000, which was authorized by the stockholders.

THE SYNCHRONOGRAPH—A NEW METHOD OF RAPIDLY TRANSMITTING INTELLIGENCE BY THE ALTERNATING CURRENT.

ABSTRACT OF A PAPER READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, APRIL 21, 1897, BY A. C. CREHORE AND G. O. SQUIER.

The alternating current is at present successfully employed for transmitting considerable amounts of power over long distances, and the whole system is periodically subjected to a regular and uniform succession of waves, rising gradually from zero to a maximum and then gradually decreasing, reversing and increasing to a negative maximum. Recognizing these facts, it seemed probable that it would constitute a good means for the rapid transmission of intelligence if the characters of a telegraphic code could be impressed upon such a current without seriously affecting its regular operation. It is to the consideration of a system of rapid transmission of intelligence by the use of the alternating current that we invite your attention.

Let the sine curve, Fig. 1, represent a regular succession of simple harmonic current waves, given to the line by an alternating current generator. If the current passes through a key which may be opened or closed at pleasure, then, provided the key previously closed is opened at a time corresponding to the point P of the wave upon the horizontal axis, it is known that the current, which was zero at the instant the key was opened, will remain zero thereafter in circuits which have resistance and inductance alone. Again, if the key could be closed exactly at a time corresponding to the point Q on the curve also upon the axis, the current will resume its flow undisturbed, according to the sine curve. The true current, obtained by opening the key at P and closing it at Q, is shown in Fig. 2, where the current remains zero between these two points. If the key had been closed at any other point than Q, as at R, the current would not have resumed its flow according to the simple sine wave, but, it can be shown, would follow the heavy curve of Fig. 3, and give a succession of waves alternately smaller and larger than the normal sine wave until after a very few alterations, when it practically coincides with the sine wave. In like manner, if the key is opened at some other point than P—when, therefore, the current is not zero—a spark may be observed at the break, and it requires time for the current to fall to zero.

Let us consider the advantages of thus operating upon an alternating current. It is evident that the advantages above mentioned, of using a system subjected to a perfectly regular alternating electro-motive force, and capable, if necessary, of transmitting considerable amounts of power, are by this method made available. In addition, no spark is made in a transmitter adjusted to break the circuit at the exact times indicated by the curve above, when the current is

naturally zero. This makes it possible, if it is found desirable, to use comparatively large electro-motive forces and currents on the line, for, no matter what the maximum value of the current, it is made and broken by this plan with no sparking. It is also possible to employ waves of high frequency upon the line, the upper limit obtainable from an alternator being probably much higher than can be transmitted over the line.

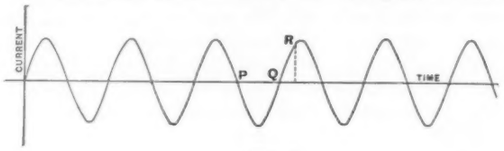


FIG. 1.

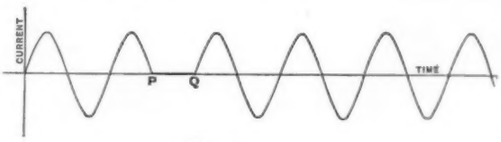


FIG. 2.

If a receiver were used which could reproduce an exact trace of the actual waves sent over the line, it might resemble such a combination as that represented by the heavy curve in Fig. 4. The sine wave continues uninterrupted to the point P, when the key is opened, and it is held open for one complete wave-length P Q, when it is again closed for a wave-length Q R; then for one-half a wave-length R S; closed for a wave-length S T; open for a wave length T U; closed for half a wave-length U V; opened for half a wave length V W, and finally closed. By this plan it is possible to use the ordinary continental code in telegraphy, a dash being indicated when two successive waves, a positive and a negative one, are omitted by keeping the key open, and a dot meaning where a single half-wave is omitted. The space between

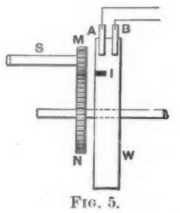


FIG. 5.

parts of a letter, as between the dash and dot of the letter "n", is indicated by the presence of one-half a wave-length, and the space between letters, as between "t" and "e" in the word "ten", by the presence of two half-waves, while the space between words may be represented by the presence of three half-waves, and between sentences of four half-waves or more.

If we suppose that the frequency is an ordinary one, used in alternating-current work, viz., 140 complete waves per second, the time required to send the word "ten" is .0394 of a second, or, by allowing three additional half-waves for the space between the words, the word "ten" would be sent just 1,200 times in one minute. There is no difficulty in using over some lines a frequency four times as great as that ordinarily used; namely, as high as 560 or even 600 periods per second. This would correspond to speeds of 4,809 and 4,143 times sending the word "ten" per minute. The limit in each instance is only determined by the particular line used.

Hitherto it has not been pointed out how it is possible to manipulate a key at the high speed mentioned, so as to open and close the circuit hundreds of times per second, as desired at the exact instants when the current is naturally zero. Evidently the proper place to manipulate such a current controller, where the circuit must be made and broken at distant points of phase, is at the generator itself, or in connection with any motor running synchronously therewith.

It will be sufficient for purposes of illustration to show by a special example how any single half-wave may thus be controlled at the generator; for, obviously, any word or sentence may be formed by a repetition of this operation.

In Fig. 5 S represents the shaft of an ordinary 10-pole, alternating-current generator, which drives through the gears M and N the wheel W. The circumference of this wheel is one continuous conductor presenting a smooth surface for brushes to bear upon. If the periphery of the wheel is divided, for example, into 40 equal parts, and it is geared to run at one-fourth the speed of the armature, each division thereof corresponds to one semi-cycle of the electro-motive force produced by the generator. Upon the wheel W bear two brushes A and B, carried by a brush-holder which is capable of adjustment. These two brushes are connected in series with the line, so that the current which passes in at one brush is conducted through the wheel to the other brush, and thence to the line. The current used may be obtained from the generator, the shaft of which is represented at S, either before or after it has passed through any number of transformers, since it is the frequency alone with which we are concerned.

The line current is brought to the wheel W to be synchronously operated upon. If both brushes remain continually in contact with the wheel, the current transmitted would have the regular sine form represented in Fig. 1, and for each revolution of the wheel there would be 40 semi-waves or 20 complete waves transmitted. If one-fortieth of the circumference of the wheel is covered by paper or other insulating material, as indicated at I, Fig. 5, and the brush A adjusted to ride on to and off from this insulation just as the current is changing from one semi-cycle to the next, that is, changing sine, while the brush B is in continuous engagement with the wheel, the semi-cycle represented by the section covered will be suppressed, and without any sparking, even if the potential used is high. In practice, the brush A is easily adjusted to this point by moving slightly backward or forward around the circumference of the wheel until the sparking ceases. This adjustment once made, the brush is fixed in position and so remains. In each succeeding revolution of the wheel this cycle of operations is exactly repeated, and the current sent over the line would resemble that shown in Fig. 2, having every fortieth semi-cycle omitted. It is only necessary to cover other similar sections of the circumference of the wheel in a predetermined order according to a code, to transmit intelligence over the line. The above illustration of the operation of a transmitter on this principle is given for simplicity only, and is evidently far from a practical form of transmitter.

The employment of alternating waves of different frequencies upon the same line by the method shown does not have the same objections which exist when a constant electro-motive force is used. Since the circuit is, by this system, always interrupted when the current is naturally zero, the frequency employed is, within certain limits, a matter of indifference, as the line is in the same condition whether a long or a short wave is used.

A new type of receiver having no inertia in the recording mechanism was used in developing the transmitter described in these experiments.

FIG. 3.

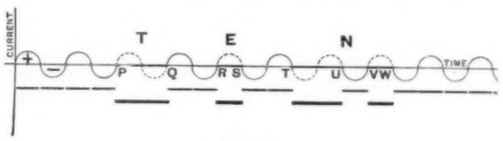


FIG. 4.

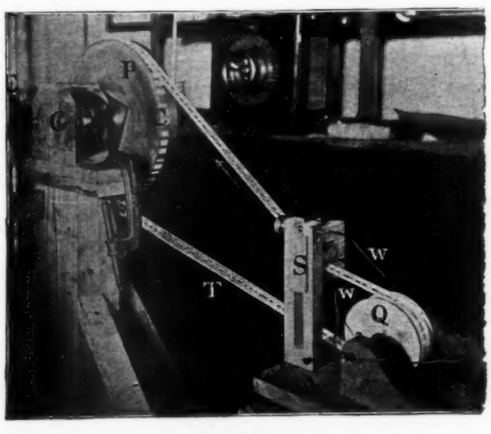


FIG. 6.

This instrument has already proved of value as a chronograph for the measurement of minute intervals of time, and for the study of any kind of variable electric currents. Although its application as a practical telegraph receiver is not at present advocated, yet the realization of a massless receiver upon different lines merits description. This receiver is based upon Faraday's discovery of a direct relation between light and electricity. This discovery was that, if a beam of polarized light is passed through some substance in the direction of the lines of magnetization within that substance, there is a rotation of the plane of polarization in a direction which is the same as the direction of the current required to produce such a magnetic field. The direction of rotation is unaltered, therefore, whether the light beam advances in the same or in the opposite direction to the magnetization, so that a beam reflected back and forth through the substance several times has its rotation increased by equal amounts each time. The medium used in the receiver is liquid carbon bisulphide, contained in a glass tube with plane glass ends. There are many other substances which will answer the purpose, some better than others. This was selected because it is very clear and colorless, and possesses the necessary rotatory property to a considerable extent. It only possesses this property, however, when situated in a magnetic field of force, and the rotatory power is proportional to the intensity of the magnetic field. To produce a magnetic field in the carbon bisulphide, a coil of wire in series with the line from the transmitter is wound around the glass tube. When the current ceases, the carbon bisulphide instantly loses its rotatory power. The operation is as follows: First, the polarizer and analyzer are permanently set in the crossed position, so that no light emerges from the analyzer. A current is sent through the coil around the tube. The plane of polarization is immediately rotated. This is equivalent to rotating the polarizer through a certain angle, and hence light now emerges from the analyzer. Break the current, the medium loses its rotatory power, and there is again complete darkness. This arrangement makes an effectual shutter for the beam without moving any mass of matter. An advantage of this receiver is that the speed is not limited by the receiver, but only by the natural properties of the line or of the transmitter. Used in connection with the transmitter already described, the real limit is found to be in the line itself.

In these experiments, the operation upon the alternating current, according to the principles already stated, was accomplished by means of a prepared perforated paper tape, which was caused to move by the generator itself. A view of this tape, showing a method of operating upon the current, is given in Fig. 6.

The line current is brought through the wires W W to two brushes B B' not shown in the view, held by the adjustable support S. The plan of the brushes is shown in Fig. 7. One brush B bears upon the tape from above, and the other brush B' bears from below, immediately opposite the other brush, so that they will meet through the perforations in the transmitting tape T. When the brushes

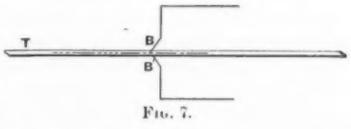


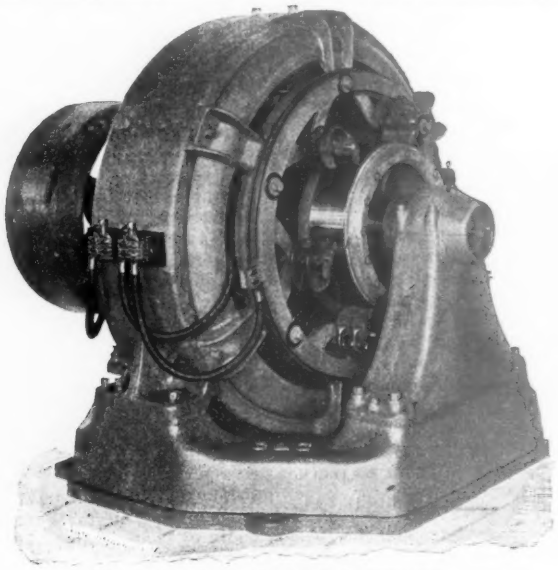
FIG. 7.

meet through the perforations in the tape, the line circuit is closed, and when paper passes between them, separating the brushes, the line circuit is broken.

(To be continued.)

New Type of Multipolar Motor.

With the view of a simple, serviceable and economical dynamo for use in central stations and isolated plants, the C & C Electric Company, 143 Liberty street, New York, have designed a slow-speed, direct-connected, six-pole generator, which is an addition to the already complete line of



New Type C & C Six-Pole Generator.

electrical machinery now made by this company.

In the construction of this machine, the aim has been to attain the highest commercial efficiency, by incorporating the greatest possible number of desirable features.

The magnetic frame is of soft, magnetic steel, with the magnetic poles so designed as to insure proper flux density in the air-gap under all conditions of load, and the field coils are reinforced to avoid injury by handling. The brush-holder is of the well known C & C reaction type. A rigid support is provided from the hub of the armature wheel for the commutator, making it possible to remove the armature and commutator from the shaft, and the bearings are self-aligning and self-oiling throughout. The other elements in the machine are those which would attract a practical engineer.

The Standard Air-Brake Catalogue.

Under the title of "The Standard Air-Brakes", Mr. E. J. Wessels, general manager of the Standard Air-Brake Company, 100 Broadway, New York city, has issued his company's annual catalogue, in the form of a tastefully prepared pamphlet, 9 by 12 inches in size. The illustrations are profuse, and the text possesses that appealingly convincing quality which is characteristic of all this company's advertising. Typographically, the catalogue leaves nothing to be desired.

The subject of air-brakes as applied to electric passenger and freight cars, locomotives, cable cars, rack-railway cars and lift-bridges is discussed in so clear a manner that the catalogue becomes at once a compendium of valuable information on this important question. Blank forms are provided, which, if filled out by the street railway manager, will enable the Standard Air-Brake Company to tell him just exactly what they can do for him in the matter of braking his cars. The record of air-brake installations already made by this company, and the "repeat" orders they have received, form practical proof of the most convincing kind—the kind that no street railway man can resist.

While any one concerned with the braking problem, including all connected with electric railway interests, is entitled to a free copy of this catalogue, the Electrical Review regretfully states that butchers, baseball players or undertakers would not enjoy its perusal or even looking at the pictures.

The "Duplex" Lamp Guard.

That there is always room for improvement in the apparently most simple device is demonstrated by the "Duplex" lamp guard, recently placed on the market by H. M. Underwood & Co., Chicago. The

The "Duplex" Lamp Guard.

many advantages of this new device will be appreciated by all who have ever been annoyed by the cumbersome process of replacing lamps where the old style, one-piece guards were used. The illustration explains the improvement fully. The guard is made to adjust itself to any socket, does not require any shade holder and will not jar open from vibration, or when hit or dropped. It is made in three styles, No. 1 being of standard size, as far as size of wire used is concerned; No. 2 is made somewhat heavier, and No. 3 is made of extra heavy wire for use in mines or other places where extra strength is required. Although on the market but a short time, the demand is, we are informed, far beyond expectations.

THIRD-RAIL SYSTEM ON AN IMPORTANT STEAM ROAD.

AN EXTENSION OF AN ALREADY SUCCESSFUL SERVICE.

The New York, New Haven & Hartford Railway directorate has made another advance in the application of electricity in the operation of its road in the electrical equipment of its line running from Berlin to New Britain, on the New Haven system, Hartford division, and from New Britain to Hartford, on the New England system, Springfield division.

The first electric car was officially run over the electrically equipped track on the 11th instant by Col. N. H. Heft, the chief of the electrical department of the New York, New Haven & Hartford Railroad, in the presence of the president, C. P. Clark, Vice-Presidents Hall and Mellen, the directors and other prominent officials of the New Haven and New England systems.

The importance of this step can hardly be gauged. Unlike the experiments at Nantasket and East Weymouth, this length of the newly equipped lines gives it an appearance of permanence, which removes it from the region of new experiments, and while it is still difficult to predict with any assurance of immediate realization the supersession of the steam locomotive, the successful operation of this line from the point of view both of electrical efficiency and financial economy will go far towards hastening the day when the steam locomotive will eventually be relegated to the limbo of half-remembered, though faithful servants.

This section is the longest section of any railroad in the world, hitherto exclusively operated by steam locomotives, to be equipped for electric traction. The total distance is 12.3 miles, divided in two parts, the first running from the power house at Berlin, the second extending from New Britain to Hartford. The road from Berlin to New Britain is single track; from New Britain to Hartford double track, the eastbound track only being devoted to electric service.

In the operation of this road the electric trains will run from Berlin to New Britain and back; the trains from New Britain to Hartford and back running as a separate service, the change of cars being made at New Britain.

This important system differs in its electrical equipment from that at Nantasket in that the trolley system of contact is not used. That adopted is the third-rail system, the conductor, or third rail, being laid along the center of the track between the running rails.

The power station of the New York, New Haven & Hartford Railroad is No. 3, that at Nantasket being No. 1, No. 2 being the power station at Stamford, Ct., from which the local trolley line is supplied with current. Power station No. 3 is a brick and stone building, two stories high, divided by a central wall into two parts—boiler room and engine room. In its present condition it forms only about half of what the station will ultimately be. The north side is closed in by boards. At what will be the center of the front wall of the completed building is a bay, in which the switchboard is erected. The present length of the building is 113 feet 3 inches; its depth, exclusive of the bay, 102 feet 5 inches, and height to ridge pole, 65 feet. It is divided by a 26-inch brick wall into two parts; the front part facing the railroad is the engine room; the rear contains the boiler equipment.

The boilers are 10 in number, each of 300 horse-power. They are tubular boilers, built by E. Kendall & Sons, Cambridgeport, Mass., and are set in two batteries of five each. In the construction of the boiler front a new method, devised by Col. N. H. Heft, chief of the electrical department of the consolidated road, who has carried out the entire electrical installation, is followed. The entire boiler front is capable of being taken down without disturbing the rest of the boiler setting, the front being bolted to a plate attached to the dividing wall, instead of to the wall itself. This innovation will be readily appreciated.

There are two feed-water pumps, either pump being capable of supplying water to both batteries at once. The piping from the boilers is in duplicate and will be covered with non-conductive covering. The flues enter a brick stack 125 feet high, located immediately in the rear of the center of the present building. The coal used is known as "locomotive sparks", the burning of which has given considerable satisfaction at the Stamford station. The coal is taken directly from the trucks in the rear of the station and is emptied into a large bin running along the back of the building.

The engine section of the building is divided into two stories, the upper one of which will contain the engines and dynamos. It is lighted by windows both in front and at the side, and is very high, spacious and well ventilated. One engine is in place, the foundations are in for another, and a third will be added as soon as demand warrants.

The projected extension of the building will hold three more, and as each engine will have a capacity of 1,200 horse-power, the total capacity of the station, when completed, will be 7,200 horse-power, nominal, which can readily be raised to 12,000 horse-power. The engine at present in position is rated at 1,200 horse-power, nominal, with dimensions 28 by 48 by 48 by 42-foot stroke, running at 100 revolutions per minute.

To the engine is directly connected a General Electric Company's standard 10-pole, 850-kilowatt generator of the ironclad type, the method of construction of which is familiar. The dynamos are over-compounded and furnish current at 600 volts no load and 650 volts full load. The switchboard in the bay is of the General Electric standard panel type, built up

of seven panels, four of which are at present blank. Of the three equipped, two are generating panels, while the third is a totalizing panel. The first two carry automatic circuit breakers with magnetic blow-out, ammeter and the usual generator panel equipment; the totalizing panel carries a Form G Thomson recording wattmeter showing the total output from the generators. A traveler with two cranes, one of 35 tons, the other of five tons capacity, runs the length of the engine room. It was built by the Berlin Iron Bridge Company, which furnished the steel roof trusses. From the switchboard run four cables, each of 850,000 circular mils, cross-section to the third rail.

The third rail is similar in shape and weight to that used on the stretch of track between East Weymouth and Nantasket Junction on the South Shore branch of the Plymouth division of the New York, New Haven & Hartford Railroad. In cross-section it resembles a flattened "A" and weighs 93 pounds to the yard. It is laid up in blocks of wood impregnated with insulating material. The blocks are only about one-half as high as those used at East Weymouth, allowing one and five-eighth inch from the eave of the third rail to the tie, and in some places only one and one-half inch. This reduction in the height of the insulating block is due to the fact that no greater height could be allowed, in view of the height of the service rails.

The top of the third rail is about one inch higher than the level of the tops of the running rails. The conductors are bonded, not by the ordinary leaf or stranded copper bond, but by plates of sheet copper one-eighth inch thick, 12 inches long and four and one-half inches wide. These are fastened to the underside of the third-rail joints by means of a drop-forged iron angle plate bolted by 16 bolts, eight for each copper plate, on each side of the third-rail joint, the nuts being outside the rail. Each bond has a capacity of about 900,000 circular mils, the total bond at each joint having about twice the carrying capacity of the rail itself, while its measured resistance is less than equal length of the 93-pound third rail. One of the most striking facts in this installation is the absence of feeders, entire dependence being placed on the carrying capacity of the well bonded rail.

FIG. 1.—TRUCK OF MOTOR CAR USED ON NEW YORK, NEW HAVEN & HARTFORD RAILROAD.

On the Berlin branch are four grade crossings; on the New Britain & Hartford line, 18. At all of these crossings the third rail is omitted, the circuit being continued under ground by stranded bare copper cables of 500,000 circular mils, and in some cases 850,000 circular mils. These cables are first drawn into creosoted wooden conduits filled with an insulating material made of residuum and asphalt. They are then laid in creosoted wooden troughs, in turn filled with the same compound and then boxed over and buried. The broken ends of the third rail are fitted with wooden inclines or approach blocks to allow the shoe to rise upon the rail without danger of catching and breaking.

The motor equipment will consist at first of five motor cars. These are open cars, 50 feet in length, used last season at Nantasket, but deprived of the trolley. Each car weighs about 32 tons. Each is equipped with two General Electric 2,000 motors and two "L" series parallel controllers. The car cut-out is a "K" automatic circuit breaker fixed beneath the hood. Each motor car is fitted with air-brakes, two gongs and a chime whistle.

Air for the brakes and whistle is furnished by a vertical double-cylinder air-pump driven by a motor automatically controlled by a special switch, which is opened when the pressure in the main tank reaches 90 pounds, and closed when it falls below that.

Contact is made with the third rail by means of sliding shoes. These are of cast-iron, 12 inches long and four inches wide, weighing about 20 pounds. They are suspended by two links from a casting fastened to a beam set immediately beneath the king pin of each truck, connection between motor and shoes being made by flexible cables. The distance between the two shoes is about 33 feet.

Many of the grade crossings are wider than this, and to avoid carrying the train over the crossing by momentum, another shoe is fitted to each truck of the second car of the train, a connection running from this shoe to the motors. Thus, by the time the last shoe has left the third rail at one end, the first shoe is in contact with the next section of the rail.

FIG. 2—ELECTRIC TRAIN ON NEW YORK, NEW HAVEN & HARTFORD RAILROAD, CONSISTING OF ONE MOTOR CAR AND ONE PASSENGER COACH.

The question of the safety of the public was not the least important, which demanded the attention of the officials of the New Haven road. In order to protect it from its own foolishness or absence of mind, the greatest precautions are taken. At Berlin and Hartford stations, the third-rail section is fenced in on both sides. At New Britain, where the lines of the New Haven and New England systems converge, in addition to the fence, a method which almost amounts to interlocking is adopted. In the "Y" formed at the convergence of the roads is the switchman's tower. From the section of the rail entering the station, cables run underground to a switchboard in the tower, for which the third rail may be connected to or disconnected from the circuit. As the train comes to a stop in the station, the third rail is cut out, and is not thrown into circuit again until the outgoing train is ready to start. The chance of accident is thus reduced to a minimum.

Credit for this installation must be awarded to President Clark for the courageous advance he has made in the application of electricity to travel on the steam line; to Col. N. H. Heft, the practical chief of the electrical department, who laid out and supervised the installations at Nantasket, East Weymouth and Berlin, and to the General Electric Company, whose long experience and perfected apparatus rendered the installation possible.

Railroad Arrangements for the Electric Light Convention.

TO THE EDITOR OF ELECTRICAL REVIEW:

The Trunk Line Association, the New England Passenger Association, the Central Passenger Association and the Southern Passenger Association have made a rate of a fare and one-third, on the certificate plan, from all points in their territory to Niagara Falls and return, for delegates to our twentieth convention, to be held at Niagara Falls, June 8, 9, 10. In purchasing tickets, ask for a certificate which will entitle the purchaser to be returned at one-third the regular fare.

The arrangement for a special train has been a somewhat perplexing question, owing to the desire that our members should enjoy the best possible service at the lowest possible rate. After long and continuous negotiations, a most satisfactory arrangement has been made with the West Shore Railroad to run a special train of vestibuled parlor, library and dining cars, leaving New York, foot Forty-second street, North River, at 10.15 A. M., and foot Franklin street, 10 A. M., Monday, June 7. Tickets to return via West Shore Railroad or New York Central & Hudson River Railroad, thus enabling the delegates who take this train to enjoy the view of both sides of the river if they so desire.

The daylight run was decided upon, owing to an almost unanimous request on the part of our members, on account of the large number of ladies who propose honoring us with their presence.

The special train has always been one of the features of our conventions, and this one promises to excel any of its predecessors, even to providing a souvenir for the ladies.

Price of ticket to Niagara Falls, including parlor car seat, $10. For ticket and parlor car accommodation, apply to C. O. Baker, Jr., 136 Liberty street, New York, master of transportation. C. O. BAKER, JR.

New York, May 14.

ADVANCE INFORMATION

Electric Light and Power.

MARTIN, TENN.—City Clerk may be addressed concerning establishment of electric light plant.

VALLEY CITY, N. D.—City Clerk may be addressed concerning establishment of municipal electric lighting plant.

KING'S MOUNTAIN, N. C.—The Dilling Cotton Mills will put in a 500-horse-power engine.

DENVER, COLO.—City Clerk may be addressed concerning construction of new electric light plant.

GLASGOW, KY.—Glasgow's electric light plant has been totally destroyed by fire at a loss of $15,000, with $10,000 insurance.

AUBURN, ILL. — Address Town Clerk concerning electric light plant to be established. Local election recently and favorable to this enterprise.

BUFFALO, N. Y.—R. G. Parsons, secretary Board of Public Works, may be addressed concerning establishment of an electric light plant at the pumping station of the Bureau of Water, foot of Massachusetts street.

GETTYSBURG, PA.—The Gettysburg electric light, heat and power plant has been sold to John A. Livers and Adam Ertter, of this place.

EATONTON, GA.—This place will soon be lighted by electricity.

GEORGETOWN, TEX.—A new electric light plant, known as the McElroy-Brett Electric Company, will be put in here at once. The projectors have received enough subscribers to put in the plant on a paying basis from the start.

OGDENSBURG, N. Y.—The City Council have granted to the Ogdensburg Power and Light Company the franchise for placing and furnishing incandescent lights for the citizens of that city.

COLLEGE POINT, L. I.—An effort is being made by a number of citizens of this place to secure an electric lighting system for the village.

MALDEN, MASS.—It is reported that the Malden Electric Company will issue bonds, the proceeds to be used in enlarging the plant.

GRIFFIN, GA.—It is reported that B. R. Blakely will not erect electric light plant.

REDLANDS, CAL.—The Southern California Power Company has been incorporated. Capital stock is $2,000,000, of which amount $399,000 has actually been subscribed. The incorporators are as follows: Henry Fisher, H. H. Sinclair, E. G. Judson, F. P. Morrison, J. H. Fisher.

BERESFORD, S. D.—The Beresford mill and electric light plant has been sold to L. N. Crill and William A. Field, of Richland, and Louis Wagner, of Lennox, who will proceed at once to put the plant in active operation.

PALESTINE, TEX.—The Citizens' Electric Light and Power Company, composed of A. C. Green, Dr. J. M. Cooley, Lee Robinson, C. C. Kennedy and others, has asked for franchise for electric light plant.

LANGDON, N. D.—Paul Gardner has been granted a five-year franchise to construct an electric light plant.

GRAND MARAIS, MICH.—An electric light plant will be established.

MINNEAPOLIS, MINN.—J. T. Fenning, engineer, is building improvements on the upper Missouri, near Helena, of 8,000 horse-power. The power is to be transmitted electrically, and used for East Helena; also to electrically light Helena, and furnish power for the street-car service.

SANFORD, N. C.—J. C. Williams desires correspondence with makers of electric plants.

STRATFORD, CAN.—It is reported that an electric light plant is to be established here.

NEWTOWN, N. Y.—North Beach Electric Light and Power Company has been incorporated. Capital, $10,000. Directors, Michael Seitz, Louis Braun and Joseph Bill, of Brooklyn.

WARREN, OHIO—The contract for electric lighting in the court house has been let to the Warren Electric Light Company.

DEMOPOLIS, ALA.—The Demopolis Electric and Power Company, F. E. Lemon, manager, will install an electric light plant of 25 arc lights and 600 incandescent.

LUBEC, ME.—The Lubec Electric Light and Power Company have organized with the following officers: C. H. Clark, president; C. J. Staples, treasurer; A. B. Sumner, secretary; C. H. Clark, C. J. Staples, A. B. Sumner, B. M. Pike, R. G. McBride, J. C. Pike and C. E. Watts, directors.

FONDA, N. Y.—A contract has been given to Streeter Brothers to furnish this village with as many 1,200 candle-power arc lights as are desired at the rate of $60 per light per year. Lights are to be kept burning from twilight until 1 o'clock A. M.

New Electric Railways.

ST. LOUIS, MO. — The General Electric Traction Company has been granted charter to build an electric system in the heart of the city.

ALBANY, N. Y.—The Buffalo & Depew Railway Company has been incorporated by Herbert P. Bissell, Wm. B. Cutter, to build an electric road from Lancaster to Buffalo, a distance of eight miles. Capital stock, $100,000.

PHILADELPHIA, PA.—The East Penn Traction Company has executed a contract with Messrs. Boody & Wheeler, of this city, for the construction of the electrical railway between Doylestown and Trenton, a distance of 25 miles. The line passes through Morrisville, Yardley, Newtown, Wrightstown, Pineville, Buckingham and Mechanics Valley.

WELLSVILLE, N. Y.—A project is under way to build an electric road from this place to Bolivar.

BUFFALO, N. Y.—The Buffalo & Depew Railroad Company has been incorporated, with a capital stock of $100,000. The company proposes to operate an electric road seven and one-quarter miles in length, from Genessee street, near the easterly line of Buffalo, in the town of Cheektowaga, and the Ellicott road, in the town of Lancaster. The directors are William B. Cutter, Augustin Smith, George A. Ricker, John H. Baker, Herbert P. Bissell, J. Henry Metcalf, George C. Riley, James Murphy and Frederick M. Turner, all of Buffalo.

ALBANY, N. Y.—The Ocean Electric Railway Company, whose principal office is to be at the village of Far Rockaway, has been incorporated. It is to be operated as a street surface road, a distance of about five miles. The capital stock is placed at $50,000. Directors for the first year are Daniel F. Lewis, Louis E. Robert and Henry R. Van Keuren, of Brooklyn, and Samuel B. Lawrence, John B. Summerfield, William H. Chesebrough, Jr., Henry M. Haviland, Francis P. Lowrey and Armitage Mathews, of New York city.

COVINGTON, KY.—A move is on foot to build an electric railway from this place to Crescent Springs, Big Bone, Burlington, Erlanger, South Erlanger, Florence, Woodside, Elsmere and other smaller towns.

New Telephone and Telegraph Companies.

GEORGETOWN, S. C.—The Waverly Telegraph and Telephone Company has been incorporated by Louis Breslauer, L. C. Lachicotte, F. W. Lachicotte and St. J. M. Lachicotte, to build and operate telegraph and telephone lines. Capital stock, $1,000.

SWEETWATER, TENN.—The Sweetwater Telephone and Improvement Company has recently been chartered, and is now operating an exchange.

PONTIAC, MICH.—A franchise has been granted to the new State Telephone Company to construct a branch to this place.

NEW LYNN, IND.—The local office of the Long-Distance Telephone Company will be located at this place, and changes are now being made. It is probable that the line will be completed to Louisville in a few days.

HOLLY, N. Y.—A telephone line is to be erected along the canal for the use of the canal officials. The job will cost the State $150,000.

LARAMIE, WYO.—The first telephone line in Big Horn County will be built this Spring and will connect Cody with Red Lodge, Mont. Citizens of Red Lodge, members of the Shoshone Land and Irrigation Company and John Chapman are the promoters of the enterprise.

LOGAN, OHIO—The telephone ordinance has been passed by the City Council. The company is now preparing for the erection of the system.

BLACK RIVER FALLS, WIS.—The Wisconsin Telephone Company has been granted a 50-year franchise by the Common Council. The line is to be a long-distance telephone, to run between Chicago and the Twin Cities, by way of Madison, Baraboo, Black River Falls, Eau Claire and Stillwater. Work is under way at the Chicago end, and will begin at St. Paul at once. The line will be ready for business by September 1.

LANCASTER, KY.—A stock company proposes to construct a telephone line from this place to Paint Lick by the way of Point Leavel.

New Manufacturing Companies.

NEW YORK, N. Y.—The Manufacturers and Inventors' Electric Company has been incorporated by Thomas J. Smith, Edward K. Curtis and William J. Cordo. Capital stock, $5,000.

NEW YORK, N. Y.—The Manufacturers and Inventors' Electric Company has been incorporated; capital stock, $5,000. Directors, Thomas J. Smith, of Roselle, N. J.; Edward K. Curtis and William J. Cordo, of Brooklyn.

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OPENING OF THE PROVIDENCE LINE.

The announcement of the reopening and the resumption of the Providence Line passenger service on May 10 is hailed with delight "by all lovers of comfortable travel". This Line is without exception the best route for all travelers desiring to visit Boston, Providence, Worcester and New England and the Maritime Provinces, combining the advantages of the longest water route and shortest rail ride, assuring passengers a full night's rest, with early arrival at destination, and the sail through Narragansett Bay and on the Providence River in the early morning or evening is a delightful feature, and will repay the early riser. The orchestras are superb, and the cuisine is equal to any first-class club or restaurant. The most distinctive feature, however, of this Line, and one so often spoken of by travelers, is the uniform courtesy shown by all its officers and employés to patrons, which is the more appreciated because so often denied the traveling public.

Steamers leave New Pier 36, North River, daily, except Sunday, at 5 30 P. M.

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To those contemplating a trip to the mountains in search of health or pleasure, Deer Park, on the crest of the Alleghany Mountains, 3,000 feet above sea level, offers such varied attractions as a delightful atmosphere during both day and night, pure water, smooth, winding roads through the mountains and valleys, Cricket grounds, Ball grounds, Golf links, Tennis courts and the most picturesque scenery in the Alleghany range. The hotel is equipped with all adjuncts conducive to the entertainment, pleasure and comfort of guests.

There are also a number of furnished cottages with facilities for housekeeping.

The houses and grounds are supplied with absolutely pure water, piped from the celebrated "Boiling Spring", and are lighted with electricity. Deer Park is on the main line of the B. & O. Railroad, and has the advantage of its splendid Vestibuled Limited Express trains between the East and West. Season excursion tickets, good for return passage until October 31, will be placed on sale at greatly reduced rates at all principal ticket offices throughout the country.

The season at Deer Park commences June 21, 1897.

For full information as to rates, rooms, etc., address D. C. Jones, Manager, Camden Station, Baltimore, Md.

Kindred.... ...Interests

The Bibber-White Company, of Boston, are carrying on an extensive railway contracting business, having in hand at the present time the construction of five roads in the New England States.

Mr. Chas. E. Hague has joined the city sales department of the Bullock Electric Company, St. Paul Building, New York city, sales agents for the Bullock Electric Manufacturing Company, of Cincinnati, Ohio.

Huebel & Manger, Brooklyn, N. Y., have enlarged their plant and increased their force, so as to be in a better position to fill the great number of orders continually coming in, and to enable them to add to the already large variety of supplies they make.

A new press for the San Francisco *Examiner* was shipped from New York the other day to San Francisco, by way of the B. & O., the Chicago & Northwestern and Union Pacific. The B. & O. took it from New York to Chicago in three days, and it reached its destination in the remarkable time of 10 days from New York, the distance being 3,406 miles. Ten years ago the average time for such shipments was 30 days.

The Carlisle & Finch Company, Cincinnati, Ohio, are sending out an attractive pamphlet describing their line of search-lights for lake, river and sea-going vessels. This company has aimed to produce a lamp of moderate price that can successfully compete with the most expensive. The construction and mechanism of the apparatus are simple, compact and durable. Those already in use have given the best of satisfaction.

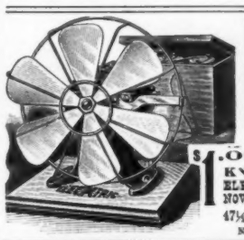
Mr. R. B. Corey, 711 Havemeyer Building, New York city, has taken the agency for Simplex wires and cables for the Middle and coast States. The Simplex Electrical Company is to be congratulated on securing the services of Mr. Corey, than whom there are few better known men in the electrical trade. Mr. Corey will be glad to welcome his many friends at his offices, and will also be pleased, incidentally, to talk to them about wires, cables and several other good things which he handles.

J. G. White & Company, Incorporated, the well known firm of electrical engineers and contractors, are now occupying one of the most desirable and elegant suites of offices in New York city. They have just moved from their old quarters on the tenth floor of 29 Broadway to a suite occupying over half of the eleventh floor in the same building. Mr. White's private office occupies the entire front of the building, and is furnished in simple but elegant taste. The business and engineering offices are in the rear of this room, extending along the southern side of the building. There are probably no other offices in the city from which such an extensive view can be had. On the east and south, everything from the Brooklyn Bridge to the Narrows is in sight, and on the west and north, New Jersey and the Hudson River may be seen.

We quote the following from the *Morning Herald,* of February 19, 1897, Sydney, N. S. W.: "A trial departmental trip was made over the tramway extension, recently completed, to the waters of Mosmann's Bay yesterday morning. It was in every way a success. One of the new motor cars left the sheds at Ridge street shortly after 9 A. M., and was taken over the whole route, going up and down the hill from the bay two or three times, every thing working smoothly. A second car made a similar trip in the afternoon with great success. The motor cars are of an improved pattern and much more powerful than those at present in use. The cars are fitted with air-brakes, provided with pressure gauges, from the works of the Standard Air-Brake Company, of New York." This tramway was opened for traffic on the first of March. The grades on this route rise as high as 7.69 per cent.

The Card Electric Company, Mansfield, Ohio, report the receipt of the following recent orders:

One 30-kilowatt direct-connected generator to Thos. McGraw, to be installed in McGraw Building, Detroit. Mich.; one 50-kilowatt direct-connected generator, Mechanical Rubber Company, Cleveland, Ohio; two 10-horse-power motors, with automatic controller for operating elevators, Edmonds Elevator Company, Cleveland, Ohio; one 100-kilowatt direct-connected generator, the Ohio & Pennsylvania Coal Company, Salineville, Ohio; one 10-horse-power motor, M. A. Bradley, Cleveland, Ohio; two 10-horse-power motors, Wolverine Manufacturing Company, Detroit, Mich.; one 100-kilowatt belt-driven generator, Monongah Coal and Coke Company, Monongah, W. Va.; one 65-kilowatt belt-driven generator, Jeffrey Manufacturing Company, Columbus, Ohio; three 25-horse-power motors, H. J. Heinz company, Allegheny, Pa.; one 11-kilowatt belt-driven generator, Union City Ice Company, Union City, Tenn; one 50-kilowatt belt-driven generator and switchboard, William Metcalf, Pittsburgh, Pa.; one 20-horse-power motor, Mansfield *News;* one 25-kilowatt belt-driven generator, Oak Ridge Hotel, Green Springs, Ohio; one 10-horse-power motor, Stewart, Howe & May, Cleveland, Ohio; two 100-kilowatt belt-driven generators, one 67-horse-power and two 30-horse-power motors to the Raton Coal and Coke Company, Raton, New Mexico.



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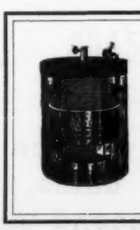

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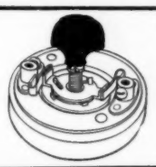

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Bottone. "Electric Bells and All About Them"	0 50	0 40
Dolbear. "The Telephone, with Directions for Making"	0 50	0 30
Cumming. "Electricity Treated Experimentally"	1 50	0 50
Gordon. "School Electricity"	2 00	0 75
Fiske. "Electricity and Electrical Engineering"	2 50	1 00
Haskins. "Transformers: Theory, Practice and Application"	1 25	0 75
Houston. "Electrical Dictionary," old	—	1 00
Prindle. "Electric Railway of To-day"	0 50	0 25
Hamilton. "Origin of Energy"	2 00	0 75
Trevert. "Electricity and Its Recent Applications"	2 00	1 00
Slater. "Telegraphic Code"	3 00	1 00
Harris. "Rudimentary Magnetism"	1 80	0 80
Harris. "Rudimentary Electricity"	0 60	0 30
Munro. "Electricity and Its Uses"	1 40	1 00
Kapp. "Alternate-Current Machinery"	0 50	0 30
Stephen. "Wrinkles in Electric Lighting"	1 00	0 60
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Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED MAY 4, 1897.

581,706 Electrical switch; G. T. Eyanson, Philadelphia, Pa.—Consists of double-circuit terminals, pivoted blades for the respective sets of terminals, an open frame or yoke connecting said blades, an operating arm extending through said frame or yoke so as to have vertical play therein, and oppositely acting springs, co-acting with said arm and the respective blades.

581,715 Electric cable; Max Guillcaume, Mulheim-on-Rhine, Germany — Comprises conductors, each inclosed within an insulating envelop, the material of which is, so far as possible, out of contact with, and is unsupported by, the conductor, the said envelops being inclosed within a soft "pressing" of rubber or similar protective material, applied in a plastic state and without crushing the envelops upon the conductors.

581,718 Electric cigar lighter; H. M. Handshy, San Antonio, Tex.

581,769 Electric railway; H. C. Reagan, Jr, Philadelphia, Pa.—Consists of an electric motor, and air compressor, and an air-storage reservoir, pipes leading to and from said reservoir, and having connection with a discharge chamber of the compressor and with the valve-chest of the latter, respectively, an electro-magnet suitably supported, and connections common to said motor and magnet.

581,802 Aero-electric whistle; C. R. Alsop, Middletown, Ct.—A signal consisting of a suitable motor, a worm, connected to the shaft thereof, a worm-wheel meshing therewith, a lug carried by the worm-wheel, a lever operated by the lug, and an air pump, having a sounding mechanism, adapted to be operated by said lever.

581,815 Telegraphy; C. F. Eaton, Jr., Santa Barbara, Cal.

581,840 Tool or appliance for use in truing up commutators of dynamos, electric machines; W. P. Adams, London, England —A frame provided with a handle and two projecting arms, one of which is pivoted or hinged to the frame, and a flexible strip connected with the ends of said arms.

581,873 Electric transformer; E. Thomson, Lynn, Mass.

581,894 Hood for incandescent lamps; W. L. Voelker, Elizabeth, N. J.

581,972 Door closer; G. W. Wright, New Haven, Ct.

581,997 Electric arc lamp; M. S. Okun, New York, N. Y.—A sliding carbon-carrying rod and a carbon-carrier at an angle to said rod, the co-operating carbon being held at an angle to the first mentioned carbon, and feeding devices for raising and lowering the carbon rod.

582,036 Electrical fuse cut-out. W. C. Bryant, Bridgeport, Ct.

582,090 Astatic electrical measuring instrument; August Raps, Berlin—An astatic galvanometer or electro-dynamometer, a pair of suitably shaped cores, made of magnetic unmagnetized metal, such as soft iron, placed at a greater distance from the stronger magnet of the astatic system than from the other.

582,102 Controller for electric cars; Pittsburgh, Pa.—A rotatable contact-bearing cylinder, with a shaft for rotating the same, said shaft being detachably connected with said cylinder, and being longitudinally movable when disconnected therefrom.

582,107 Selective signaling circuit apparatus and system; G. W. Whittemore and J. A. Barrett, Brooklyn, N. Y.

582,111 Switch for electric circuits; A. J. Wurts, Pittsburgh, Pa.

582,114 Controller for electric motors; H. P. Davis, Pittsburgh, Pa.—A method consisting of the following steps: Connecting two electric motors in series with resistances, opening the entire circuit, coupling the motors in parallel with resistances and cutting out the resistances.

582,115 Method of and means for controlling electric motors; H. P Davis.

582,120 Astatic galvanometer; Adolph Franke, Berlin, Germany—A swinging system of astatic needles, and attached thereto, a second adjustable magnetic system, considerably weaker than said first-named system.

582,130 Index for books; Warren D. Kerr, Henrietta, Tex.

582,131 Alternating current, regulation and distribution; B. G. Lamme, Pittsburgh, Pa.

582,132 Alternating current motor; B. G. Lamme, Pittsburgh, Pa.—Comprises an armature having a distributed winding, a starting resistance normally in circuit therewith, a short circuiting device for said resistance surrounding said winding and means for moving said device ioto and out of direct engagement with the winding.

582,149 Electric switch; J. A. Spiker, Grand Island, Neb.

582,157 Telegraphic apparatus; C. F. Eaton, Jr., New York, N. Y.

ISSUED MAY 11, 1897.

582,187 Telephone-controlling device; T. A. Dull, Chicago, Ill.

582,200 Telephone transmitter; R. P. Green, Columbus, Ohio—A microphonic element composed of oxygenated sulphide of copper.

582,218 Electric motor; J. A. Mosher, Chicago, Ill.—An armature for electro-magnets consisting of a number of plates arranged in succession upon a shaft obliquely to the axis thereof.

582,237 Electrically propelled agricultural implement; H. Schimpff, Halle-on-the-Salle, Germany—Means for transmitting electric energy to electrically driven agricultural implements, comprising a bare conductor, portable supports therefor, provided with a conductive track electrically connected with said conductor, a motor carriage and a rigid sliding contact on said carriage adapted to slide along said bare conductor and along the under side of the conductive track of its supports.

582,259 Electric trolley device; W. M. Brown, Johnstown, Pa.—Consists of an upwardly pressed tube having a longitudinal opening, a member adapted to move longitudinally along said tube and bearing on the inside thereof, and a contact maker mounted upon said moving member.

582,262 Electrically actuated switch; J. Bryan, Pittsburgh, Pa. — Consists of a movable switch-point, a lever, a cam mechanism for operating said lever, a magnet for operating the cam mechanism and a yielding connection between the lever and the movable switch-point.

582,269 Armature for dynamo electric machines; E P. Clark, New York—A laminated toothed armature, and iron strips secured to the top of the teeth and overhanging the grooves on each side thereof, for the purpose of retaining the coils in place.

582,273 Electrical striking and alarm attachment for clocks; B. De Witt, Terra Alta, W. Va.

H. M. Underwood & Company, Chicago, have just been appointed Chicago agents for the Belknap Motor Company, of Portland, Me., whose latest specialty, the Chapman regulator, is meeting with success. Mr. Underwood has been in the electrical business for some 13 years, and during that time has made such a large number of friends that it will be an easy matter for him to obtain a proper share of the western business. The Belknap Motor Company is to be congratulated on obtaining the services of such an enterprising and wide-awake representative as Mr. Underwood.

At first thought one might be inclined to believe that, with the advent of dynamo currents for telegraph, telephone and other signaling devices, the old-time Callaud, or bluestone, batteries would be used less each year. Such, however, is not the case, according to Mr. Burlingham, of the McDermid Manufacturing Company, Chicago, who states that orders for gravity battery coppers are steadily increasing. Probably the uniform high grade of the company's coppers and the low price at which they are sold are to a large extent responsible for the gratifying condition of the company's business.

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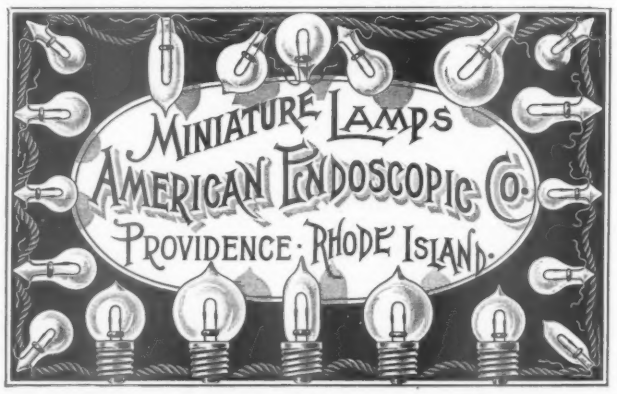

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